

# **APPENDIX III**

## **TAB M**

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

Page 1

IN THE UNITED STATES DISTRICT COURT  
FOR THE MIDDLE DISTRICT OF PENNSYLVANIA

TAMMY KITZMILLER; BRYAN AND  
CHRISTY REHM; DEBORAH FENIMORE  
AND JOEL LIEB; STEVEN STOUGH;  
BETH EVELAND; CYNTHIA SNEATH;  
JULIE SMITH; AND ARALENE  
("BARRIE") D. AND FREDERICK B.  
CALLAHAN,

Plaintiffs,

vs.

Case No. 4 CV 04-2688

DOVER AREA SCHOOL DISTRICT;  
DOVER AREA SCHOOL DISTRICT  
BOARD OF DIRECTORS,

Defendants.

DEPONENT: ROBERT T. PENNOCK, Ph.D.  
DATE: Tuesday, June 14, 2005  
TIME: 9:31 a.m.  
LOCATION: 100 Renaissance Center, 36th Floor  
Detroit, Michigan  
REPORTER: Elizabeth G. LaBarge, CSR-4467

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 2</p> <p>1 APPEARANCES:</p> <p>2</p> <p>3 THOMAS B. SCHMIDT, III</p> <p>4 Pepper Hamilton LLP</p> <p>5 200 One Keystone Plaza</p> <p>6 Harrisburg, Pennsylvania 17101</p> <p>7 (717) 255-1155</p> <p>8 Appearing on behalf of the Plaintiffs.</p> <p>9</p> <p>10 PATRICK GILLEN</p> <p>11 Thomas More Law Center</p> <p>12 24 Frank Lloyd Wright Drive</p> <p>13 Ann Arbor, Michigan 48105</p> <p>14 (734) 827-2001</p> <p>15 Appearing on behalf of the Defendants.</p> <p>16</p> <p>17</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p>	<p style="text-align: right;">Page 4</p> <p>1 Detroit, Michigan</p> <p>2 Tuesday, June 14, 2005</p> <p>3 9:31 a.m.</p> <p>4 * * *</p> <p>5 ROBERT T. PENNOCK, Ph.D.</p> <p>6 having been first affirmed to tell the truth, was</p> <p>7 examined and testified as follows:</p> <p>8 EXAMINATION</p> <p>9 BY MR. GILLEN:</p> <p>10 Q Good morning, Dr. Pennock.</p> <p>11 A Good morning.</p> <p>12 Q I've introduced myself to you off the record and let me</p> <p>13 do so now for the purposes of the record. My name is</p> <p>14 Pat Gillen and I am one of the attorneys for the</p> <p>15 defendants in this litigation where you've agreed to</p> <p>16 appear as an expert. As you know, your client, the</p> <p>17 plaintiffs, have made you available today for the</p> <p>18 purpose of your expert deposition, which I conceive as</p> <p>19 my chance to ask you some questions about your opinion</p> <p>20 and try to get a better sense of where you're coming</p> <p>21 from. The deposition process is rather unusual in a few</p> <p>22 ways and I'd like to draw at least some of those unusual</p> <p>23 characteristics to your attention.</p> <p>24 First, the court reporter will transcribe, make a</p> <p>25 written record of our exchange, and that places a</p>
<p style="text-align: right;">Page 3</p> <p>1 INDEX</p> <p>2</p> <p>3 WITNESS PAGE</p> <p>4</p> <p>5 ROBERT T. PENNOCK, Ph.D.</p> <p>6</p> <p>7 Examination by Mr. Gillen 4</p> <p>8</p> <p>9</p> <p>10</p> <p>11 EXHIBITS</p> <p>12</p> <p>13 NUMBER IDENTIFICATION PAGE</p> <p>14</p> <p>15 No. 1 Dover Expert Report of</p> <p>16 Robert T. Pennock, Ph.D. 44</p> <p>17 No. 2 Biology Curriculum Press Release 125</p> <p>18 * * *</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p>	<p style="text-align: right;">Page 5</p> <p>1 premium on verbal responses. And as we all know, in</p> <p>2 day-to-day conversation we frequently respond with head</p> <p>3 nods and gestures or, what should we say, sounds, but</p> <p>4 here, please keep in mind that we need an answer and try</p> <p>5 and strive for just that, a verbal answer.</p> <p>6 A I will try to do that.</p> <p>7 Q Thank you, I appreciate it. Second, the process also</p> <p>8 tends to highlight the imprecision of human</p> <p>9 communication. Doubtless in this process you will find</p> <p>10 some of my questions somewhat vague or imprecise. If</p> <p>11 that is the case, please let me know and I'll do my best</p> <p>12 to rephrase the question and be more precise. By the</p> <p>13 same token, the subject matter is somewhat foreign to</p> <p>14 me, so please bear with me if I am trying to understand</p> <p>15 your answer.</p> <p>16 Because the proceedings are transcribed, it's best</p> <p>17 if you wait until I complete my question before</p> <p>18 answering. And again, in day-to-day conversation we</p> <p>19 frequently answer before the question is complete</p> <p>20 because we know or have a good sense for what's going to</p> <p>21 be asked, but for the purpose of the record, it's better</p> <p>22 to wait. That's difficult with me sometimes because I</p> <p>23 tend to pause as I ask questions. Do your best and I</p> <p>24 will too.</p> <p>25 The process is not an endurance contest. If at any</p>

2 (Pages 2 to 5)

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 6</p> <p>1 time you want to take a break, please let me know and 2 we'll do that. 3 A All right. 4 Q Likewise, my purpose here today is not to oppress or 5 embarrass you in any way. If I'm asking a question, and 6 I think this is unlikely, but if I do ask a question 7 that makes you feel uncomfortable, please let me know 8 and I will address that area of sensitivity to the 9 extent I can yet consistent with my duty to my client. 10 I believe that's all for the preliminary matters. 11 Would you please state and spell your full name for 12 the record? 13 A My name is Robert Pennock, P-e-n-n-o-c-k. 14 Q And would you give your current address? 15 A 609 Sunset Lane, East Lansing, Michigan 48823. 16 Q And your current place of employment? 17 A Michigan State University. 18 Q And the position you hold there currently is? 19 A I am currently associate professor for the next two 20 weeks. 21 Q And then are you becoming full professor? 22 A Yes. 23 Q Congratulations. 24 A July 1st. 25 Q I want to get a little better sense for where you're</p>	<p style="text-align: right;">Page 8</p> <p>1 what is doing the explanation. 2 Q So do I understand you correctly that the prior 3 understanding just posited a logical grammatical 4 relation and not a logical empirical relation? 5 A Maybe you can say what you mean by a logical empirical 6 relation. 7 Q Just as you say, I'm trying to explain the difference 8 between this particular theory of causation and its 9 predecessor. 10 A Gotcha. 11 Q Thank you. 12 A So that's -- if I understand your question, that's 13 correct. A previous notion would have said for 14 something to count as an explanation, this sentence has 15 to bear a logical relationship to this other sentence, 16 so we wouldn't have called it grammatical relationship, 17 it's a logical relationship, particularly a deductive 18 relationship. And the causal-mechanical account rejects 19 that view. There are other theories of explanation, as 20 well, but that's one contrast. 21 Q And when you reference logical relationship, am I 22 understanding you correctly that it's sort of formal 23 logic as in instruction to receive in logic, or is it 24 somehow different, this logical relationship that's 25 characteristic of the pre-causal-mechanical account?</p>
<p style="text-align: right;">Page 7</p> <p>1 coming from and some of the work that you've done, which 2 again is foreign to me. And I'd just like to briefly 3 ask you about your dissertation just so I have a sense 4 for how you approach the subject matter and how that 5 work relates to your larger corpus of work. 6 In your dissertation, you mentioned the 7 causal-mechanical account and the nature of scientific 8 explanation. If you would, just give me your definition 9 of that term, the causal-mechanical account? 10 A The causal-mechanical account is an analysis of 11 scientific explanation. It's Wesley Salmon's account, 12 he's the one who came up with the term, he's the one who 13 came up with the analysis, and what the theory of 14 explanation does is try to say here's what it means to 15 be a scientific explanation. The causal-mechanical 16 account says that for something to be a scientific 17 explanation, there has to be a particular kind of 18 relationship between what is explained and what is doing 19 the explaining. On previous accounts, the thought was 20 that that relationship was a logical one between 21 sentences, and the causal-mechanical account says that 22 that's not the case and that the scientific explanation 23 relationship is a relationship between events, it's a 24 causal relationship, something explains something else 25 by virtue of the causal relationship that it bears to</p>	<p style="text-align: right;">Page 9</p> <p>1 MR. SCHMIDT: Object to the form. 2 A So maybe you could rephrase that. It sounds like you 3 need to explain something a little bit better. 4 BY MR. GILLEN: 5 Q Sure. And I'm just trying to see where you come from by 6 virtue of your background as you look at this subject 7 matter and I'm wondering -- let me ask you this way. 8 Under this prior account of scientific explanation 9 which placed a premium on logic and I take it deductive 10 logic? 11 A Correct. In the core case. It didn't require that all 12 kinds be deductive. There were also inductive models, 13 as well, but the core case, just for -- to make it 14 clear, this is called the deductive nomological model. 15 Q Thank you. 16 A On that view, it is a deductive relationship, that's the 17 primary relationship. There are other parts of the 18 model, but that's the key one. 19 Q Okay. Maybe if I ask it this way, it will help. 20 Under this theory we're discussing now, deductive 21 nomological, is that correct? 22 A Yes. 23 Q Is that n-o-m-i? 24 A Nomological. N-o-m-o-l-o logical. 25 Q How would that be proven, how would such scientific</p>

3 (Pages 6 to 9)

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 10</p> <p>1 explanation be proven false under that theory?</p> <p>2 A This is the theory of explanation.</p> <p>3 Q Okay.</p> <p>4 A Not a theory of confirmation.</p> <p>5 Q So under that prior theory, could you have an</p> <p>6 explanation that was incapable of confirmation?</p> <p>7 A Again, this is not a theory of confirmation, it's a</p> <p>8 theory of what makes one thing explain another.</p> <p>9 Q What's the difference between a theory of explanation</p> <p>10 and a theory of confirmation in your profession?</p> <p>11 A What one is doing in the philosophy of science is</p> <p>12 explicating the concepts that scientists use. So two of</p> <p>13 the central topics within philosophy of science have to</p> <p>14 do with those two central concepts, explanation,</p> <p>15 confirmation. In the former, a philosopher of science</p> <p>16 asks what does it mean to say scientifically that</p> <p>17 something is explained or that we as scientists have</p> <p>18 explained something. For confirmation, the concept is</p> <p>19 what's the nature of the relationship of evidence, that</p> <p>20 is to say, what is it to say that this hypothesis has</p> <p>21 been confirmed by this data. Those two are related, but</p> <p>22 the concepts themselves are different.</p> <p>23 Q Just to try and get a handle on this, in terms of the</p> <p>24 subject matter of this dispute, intelligent design</p> <p>25 theory, and I recognize that you have some reservations</p>	<p style="text-align: right;">Page 12</p> <p>1 Q Sure. Well, do you have an opinion concerning whether</p> <p>2 intelligent design theory, for example, as proposed by</p> <p>3 Michael Behe in his concept of irreducible complexity</p> <p>4 does not purport to explain anything?</p> <p>5 A He does purport to explain something. But he's not</p> <p>6 giving a theory of explanation.</p> <p>7 Q And if I ask you the same question with respect to the</p> <p>8 concept of specified complexity associated with William</p> <p>9 Dembski, is it your opinion that that does not purport</p> <p>10 to explain anything?</p> <p>11 A In the same way, Dembski's notion of specified</p> <p>12 complexity is purporting to explain something, but is</p> <p>13 not a theory of explanation.</p> <p>14 Q In these answers, you're using what at least to me as a</p> <p>15 layman seems to be a term of art, and that's the theory</p> <p>16 of explanation.</p> <p>17 What does that mean in your discipline?</p> <p>18 A As I said, what one does in the philosophy of science</p> <p>19 professionally is try to understand the nature of</p> <p>20 scientific concepts, and to say that in the philosophy</p> <p>21 of science one gives a theory of explanation, what I</p> <p>22 mean by that is an account, a philosophical account of</p> <p>23 the nature of explanation in science.</p> <p>24 Q And in terms of your discipline, an account of the</p> <p>25 nature of explanation means what?</p>
<p style="text-align: right;">Page 11</p> <p>1 about that, in terms of this dichotomy between</p> <p>2 explanation and confirmation, where does intelligent</p> <p>3 design theory fit if it's taken in the way it's proposed</p> <p>4 by its adherents? Does it purport to be a theory of</p> <p>5 explanation, does it purport to be a theory of</p> <p>6 confirmation, how do you see that?</p> <p>7 MR. SCHMIDT: Just let me ask, you want him to say</p> <p>8 what he thinks the proponents believe?</p> <p>9 MR. GILLEN: Right, yes.</p> <p>10 MR. SCHMIDT: Okay.</p> <p>11 A I don't think that they are putting it forward either as</p> <p>12 a theory of explanation or as a theory of confirmation.</p> <p>13 BY MR. GILLEN:</p> <p>14 Q And why do you say that?</p> <p>15 A They're putting it forward as, quote, an alternative</p> <p>16 theory, they're claiming that they have found something</p> <p>17 true about the world. So the claim is that that's a</p> <p>18 conclusion. But that's different from a theory of</p> <p>19 explanation, a theory of confirmation, an analysis of</p> <p>20 those.</p> <p>21 Q So in your view, intelligent design theory as proposed</p> <p>22 by Behe does not purport to explain anything?</p> <p>23 MR. SCHMIDT: Object to the form.</p> <p>24 A Yeah, could you say that again?</p> <p>25 BY MR. GILLEN:</p>	<p style="text-align: right;">Page 13</p> <p>1 A The term that philosophers of science use is</p> <p>2 explication, so one gives an explication of a concept.</p> <p>3 So to give an account of something technically or to</p> <p>4 give a theory of something we would say is to give an</p> <p>5 explication of something. And what that means is one</p> <p>6 looks at the concept as it is used in science by the</p> <p>7 profession, by the scientific community, and tries to be</p> <p>8 systematic about understanding the underlying</p> <p>9 relationships there that are sometimes unarticulated.</p> <p>10 To explicate something is to begin with the</p> <p>11 ordinary notions as used in the profession and then to</p> <p>12 tease out in as careful a way as one can what is really</p> <p>13 going on in that relationship and to spell it out. So</p> <p>14 an account of explanation and explication does that with</p> <p>15 regard to the nature of what we say is a scientific</p> <p>16 explanation as opposed to just an ordinary explanation.</p> <p>17 Q Do I understand you correctly that the explication of</p> <p>18 the concept is, you say tease out, kind of the</p> <p>19 unpacking also of unarticulated but - unarticulated</p> <p>20 concepts that are being used in connection with the</p> <p>21 concept that is the subject of your scrutiny?</p> <p>22 A I'm going to have to ask you to say that again.</p> <p>23 Q Okay, that's fine. You say, if I understand you</p> <p>24 correctly, that the explication of a concept is to tease</p> <p>25 out additional, it seems, concepts that are packaged or</p>

4 (Pages 10 to 13)

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 14</p> <p>1 packed into the scientific concept that you're studying,  2 is that accurate?</p> <p>3 A So again, the way in which we use the concept in the  4 philosophy of science is to take notions as they're used  5 by scientists and to give an analysis of them such that  6 you have a systematic, more precise account. A teasing  7 out, that's the term that I had used, or unpacking, the  8 term that you used, is fair in the sense that what one  9 is doing is trying to bring out explicitly what might be  10 understood tacitly or might be understood explicitly, it  11 depends on the case, but to make those things clear.  12 Now, it's not to put in extra concepts, I mean, the idea  13 is to find out what the proper understanding really is.</p> <p>14 Q Would this be in the nature -- would the unpacking that  15 you reference consist in making explicit or plain or  16 more readily understood the a priori assumptions that  17 are part of using the concept you are explicating?</p> <p>18 A Could you say that just one more time, please?</p> <p>19 BY MR. GILLEN:</p> <p>20 Q Certainly, no problem. And again, forgive me if I'm  21 struggling just to get a handle on the way in which you  22 approach the subject matter.</p> <p>23 A That's fine.</p> <p>24 MR. GILLEN: Would you read that back?</p> <p>25 (Record repeated.)</p>	<p style="text-align: right;">Page 16</p> <p>1 you received your degree?</p> <p>2 A I taught at the University of Texas in Austin for eight  3 years and then at the College of New Jersey for one year  4 and then I moved to Michigan State in 2000.</p> <p>5 Q What was your rank at UT Austin?</p> <p>6 A Assistant professor.</p> <p>7 Q And College of New Jersey?</p> <p>8 A Assistant professor.</p> <p>9 Q And you came to MSU as?</p> <p>10 A Associate professor.</p> <p>11 Q And in two weeks, you're a full professor?</p> <p>12 A That's right.</p> <p>13 Q In light of your undergraduate major, do you consider  14 yourself a biologist?</p> <p>15 A In light of my undergraduate major, that's not -- that's  16 not what I would say an undergraduate major by itself  17 provides.</p> <p>18 Q That's all I was trying to understand. So it seems the  19 answer is no?</p> <p>20 A If it's in light of my undergraduate major, no.</p> <p>21 Q And perhaps I'm failing to grasp the protocols of your  22 profession.</p> <p>23 I guess I should ask in light of your professional  24 training, do you consider yourself a biologist?</p> <p>25 A I consider myself a philosopher of biology.</p>
<p style="text-align: right;">Page 15</p> <p>1 A If the focus is on is the point of this to make plain  2 the a priori assumptions, the answer is not necessarily.  3 It could include that. If there are such things. It  4 simply means to give an analysis, a systematic, coherent  5 account of the nature of the concept.</p> <p>6 BY MR. GILLEN:</p> <p>7 Q Let me see if I can work my way around this and  8 understand it better later. Let me go back and just get  9 a sense for where you're coming from.</p> <p>10 Give me a sense for your educational training in  11 the undergraduate and graduate levels?</p> <p>12 A As an undergraduate, I had a double major in philosophy  13 and biology. And my graduate work was in history and  14 philosophy of science.</p> <p>15 Q Did you get a B.S. in Biology as part of your double  16 major?</p> <p>17 A They did not have a B.S. degree, it was a B.A. degree.</p> <p>18 Q In biology?</p> <p>19 A Joint in biology and philosophy.</p> <p>20 Q And did you take additional science courses in your  21 graduate work?</p> <p>22 A I took a computer science course.</p> <p>23 Q One or more computer science courses?</p> <p>24 A If my memory serves, two.</p> <p>25 Q And give me a sense for your employment history after</p>	<p style="text-align: right;">Page 17</p> <p>1 Q And you've referenced some graduate work in computer  2 science. I know just from my reading in the case that  3 there's sort of mathematical theories involved.</p> <p>4 In light of your professional training, do you  5 consider yourself a mathematician?</p> <p>6 A No.</p> <p>7 Q How about in light of your professional training, do you  8 consider yourself a computer scientist?</p> <p>9 A I'm currently a faculty member in the Department of  10 Computer Science and Engineering, as I am a faculty  11 member in the program on ecology, evolutionary biology  12 and behavior. That's a little different from saying I'm  13 a computer scientist, even though I do work in computer  14 science, I do research in that. I do research in  15 biology, as well.</p> <p>16 Q So it seems like you are not a computer scientist, is  17 that correct?</p> <p>18 MR. SCHMIDT: Object to the form.</p> <p>19 BY MR. GILLEN:</p> <p>20 Q Is it?</p> <p>21 A I am a faculty member in the Department of Computer  22 Science.</p> <p>23 Q I understand that. So it's plain you have sufficient  24 knowledge of it to be placed there.</p> <p>25 What is your position in the computer science</p>

5 (Pages 14 to 17)



ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 18</p> <p>1 department?</p> <p>2 A The position is an adjunct -- an adjunct professor. I</p> <p>3 actually don't know what the title is, it could be</p> <p>4 associate faculty, the bureaucratic title is actually</p> <p>5 beyond me at this point. I think -- if you need to know</p> <p>6 that, I could find out what the bureaucracy says.</p> <p>7 Q Okay. In terms of your association with the computer</p> <p>8 science department, what do you provide instruction in?</p> <p>9 A I do not teach courses in the department. I have not</p> <p>10 yet taught courses in the department.</p> <p>11 Q But I understand from your report that you do scientific</p> <p>12 research on experimental evolution and evolutionary</p> <p>13 design using evolving computer organisms, is that</p> <p>14 correct?</p> <p>15 A That's correct.</p> <p>16 Q I want to just get a sense for that project, but before</p> <p>17 I do that, let me ask you, what have you done to prepare</p> <p>18 to render an opinion in this case?</p> <p>19 A How far back should I start? The primary basis for my</p> <p>20 expertise with regard to intelligent design creationism</p> <p>21 goes back to 20 years of reading and writing and</p> <p>22 researching creationism in general, and then within the</p> <p>23 last 15 years intelligent design creationism in</p> <p>24 particular.</p> <p>25 With regard to specifically preparing for my expert</p>	<p style="text-align: right;">Page 20</p> <p>1 A That's correct.</p> <p>2 Q And in terms of the reports of experts retained by the</p> <p>3 defendants, can you remember whose reports you looked</p> <p>4 at?</p> <p>5 A Oh, actually, let me -- I actually also briefly looked</p> <p>6 at Haught's report, skimmed through that at one point.</p> <p>7 So in preparation -- you said in preparation -- there</p> <p>8 was a time in preparation, again, I'm not sure far back,</p> <p>9 when I did meet with our attorneys, and at one point</p> <p>10 there when I first got those reports, I did also look</p> <p>11 briefly at Haught's.</p> <p>12 Q Did you find anything in that report that you disagreed</p> <p>13 with?</p> <p>14 A Not that I recall. If there's something in particular</p> <p>15 you want me to look at, I'd have to refresh my memory.</p> <p>16 Q No, that's fine, I just want to get a sense for your</p> <p>17 preparation.</p> <p>18 How about in terms of our experts, the experts</p> <p>19 retained by the defendants, whose reports have you</p> <p>20 looked at?</p> <p>21 A There I looked at the one by Nord. One by Campbell,</p> <p>22 Dembski. Behe. And then the rebuttal reports,</p> <p>23 particularly the one by Meyer and Fuller.</p> <p>24 Q Anything else --</p> <p>25 A Let me just see if I --</p>
<p style="text-align: right;">Page 19</p> <p>1 report, I looked again at the text Of Pandas and People,</p> <p>2 which I had read actually much earlier, back in the</p> <p>3 early nineties, so I just refreshed my memory on that.</p> <p>4 In preparation for today's deposition, I also read</p> <p>5 the reports from some of the rebuttal witnesses and</p> <p>6 reviewed some of the initial expert reports from the ID</p> <p>7 side.</p> <p>8 Q Have you looked at reports that have been provided by</p> <p>9 other experts who have been retained by the plaintiffs?</p> <p>10 A I skimmed through -- oh, from the plaintiffs?</p> <p>11 Q Yes.</p> <p>12 A The --</p> <p>13 Q Yes.</p> <p>14 A I may have looked through in a very cursory fashion the</p> <p>15 report from Miller. And if so, that was a while -- that</p> <p>16 was when it first came out, I actually did not read</p> <p>17 that -- basically, I did not really read our reports.</p> <p>18 Q Okay. Let me just try and go through the ones that</p> <p>19 occur to me.</p> <p>20 Ken Miller's you may have looked through?</p> <p>21 A If so, I flipped through it very quickly. That's the</p> <p>22 only one I think I may have looked at.</p> <p>23 Q So in terms of any disagreement with anything in those</p> <p>24 reports, you really -- it sounds like you didn't focus</p> <p>25 your attention on those, is that accurate?</p>	<p style="text-align: right;">Page 21</p> <p>1 Q I'm sorry.</p> <p>2 A Can you remind me of the other report names?</p> <p>3 Q The other --</p> <p>4 A The other main reports?</p> <p>5 Q Oh, for the plaintiffs? Or for the defendants? Let's</p> <p>6 see at this point. There's Behe, Minnich --</p> <p>7 A I looked briefly at Minnich's, as well.</p> <p>8 Q Anything else by way of way of familiarizing yourself</p> <p>9 with the case? I mean, I understand that, plainly,</p> <p>10 you've got a substantial body of scholarly work that</p> <p>11 you've brought to the table. With these questions, I'm</p> <p>12 just trying to get a sense for the way in which you</p> <p>13 related that knowledge to the facts of this case.</p> <p>14 Is there anything else you've done besides the</p> <p>15 review of the expert reports you've discussed, taking a</p> <p>16 look again at Of Pandas? Did you look at the Board....</p> <p>17 policy?</p> <p>18 A I looked at the Board policy, yes. Before doing my</p> <p>19 initial report.</p> <p>20 Q Anything else?</p> <p>21 A Followed newspaper reports. Op-Eds. In terms of</p> <p>22 reading, those are the things I recall.</p> <p>23 Q Now --</p> <p>24 MR. SCHMIDT: Patrick, can we just clarify</p> <p>25 something?</p>

6 (Pages 18 to 21)

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 22</p> <p>1 MR. GILLEN: Certainly.</p> <p>2 MR. SCHMIDT: And forgive me for going at it this</p> <p>3 way. I think that two topics got blurred together, one</p> <p>4 was what he did in preparation for preparing his report,</p> <p>5 and I think that that's looked at Pendas, the Board</p> <p>6 policy, followed news reports, Op-Eds and so on, and</p> <p>7 then he talked about things he did to familiarize</p> <p>8 himself with the case before his deposition in the</p> <p>9 intervening period between the report and today, as I</p> <p>10 understand, and that was when he described how he looked</p> <p>11 at various reports. But I wanted to make it clear, as I</p> <p>12 understand it, that he didn't review those reports as</p> <p>13 part of his pre-report writing work, I think that's</p> <p>14 right, but --.</p> <p>15 A That's quite right.</p> <p>16 MR. GILLEN: Okay, good enough. Thank you, Tom.</p> <p>17 BY MR. GILLEN:</p> <p>18 Q Let me ask you a few questions about your, what shall I</p> <p>19 say, computer science project that you're working on,</p> <p>20 this research on experimental evolution and evolutionary</p> <p>21 design using evolving computer organisms. And I can</p> <p>22 tell you that that's utterly foreign to me, but I'd like</p> <p>23 to get some idea for how that project operates and what</p> <p>24 its purpose is.</p> <p>25 What is that project, what is its nature and what</p>	<p style="text-align: right;">Page 24</p> <p>1 instructions, that like other -- any other computer</p> <p>2 software system works by executing the instructions in</p> <p>3 sequence. These organisms as they self-replicate can</p> <p>4 have any of those instructions randomly mutated in the</p> <p>5 process of replication so that the offspring can have at</p> <p>6 any point in the genome a randomly different instruction</p> <p>7 that replaces it, for example.</p> <p>8 Q So do the instructions for the computer organism include</p> <p>9 an instruction to change at random to a certain degree?</p> <p>10 A The organism doesn't have the instruction to change</p> <p>11 itself at random. The environment is set up so that</p> <p>12 mutations happen at some rate, and that rate can be set</p> <p>13 or allowed to vary on its own, depending on the kind of</p> <p>14 experiment one wants to do.</p> <p>15 Q And again, forgive me, I'm just trying to get a handle</p> <p>16 on the basic parameters of this project.</p> <p>17 You say the environment is set up to vary the</p> <p>18 instructions. What are you referring to there?</p> <p>19 A The digital organisms exist in a virtual environment,</p> <p>20 essentially, the core of the computer, not that you have</p> <p>21 a virtual computer within the computer, but in memory,</p> <p>22 and that environment is like the environment that</p> <p>23 biological organisms are in, it has certain parameters,</p> <p>24 certain features.</p> <p>25 This particular feature is the one that says how</p>
<p style="text-align: right;">Page 23</p> <p>1 is its purpose?</p> <p>2 A The project on evolving computer organisms is a team</p> <p>3 research effort at Michigan State with a team of faculty</p> <p>4 members from biology, computer science, philosophy,</p> <p>5 really an interdisciplinary group, and graduate students</p> <p>6 also in a number of different departments. We work on a</p> <p>7 system, an artificial life system, whereby we can test</p> <p>8 evolutionary hypotheses by setting up controlled</p> <p>9 experiments on digital organisms that evolve.</p> <p>10 Q And is the system designed to approximate the factors</p> <p>11 that influence biological systems?</p> <p>12 A The system, which is called AVIDA, A-V-I-D-A, is a</p> <p>13 system that instantiates the evolutionary mechanism, it</p> <p>14 instantiates Darwin's law. And in that sense, it's not</p> <p>15 an approximation, it's an actual implementation of it,</p> <p>16 it's the real thing.</p> <p>17 Q And when you refer to Darwin's law, what are you</p> <p>18 referring to?</p> <p>19 A I'm referring to the mechanism, the causal mechanism</p> <p>20 that Darwin discovered of natural selection working on</p> <p>21 random variation that's heritable.</p> <p>22 Q How does the system instantiate the random mutation</p> <p>23 component of that causal explanation?</p> <p>24 A The system works by computer organisms which are a set</p> <p>25 of instructions, a genome of very low-level computer</p>	<p style="text-align: right;">Page 25</p> <p>1 often, at what rate will mutations happen at</p> <p>2 replication, so for any given site, what percentage will</p> <p>3 get a mutation in the course of replication. So it's</p> <p>4 not something within the organism itself, it's just part</p> <p>5 of the environment. You can think of it as a cosmic ray</p> <p>6 coming in and changing a -- changing the DNA. In this</p> <p>7 case, the instruction set is not DNA, the instruction</p> <p>8 set is the computer language. The set of instructions</p> <p>9 there is such that any one of them can be replaced by</p> <p>10 any other of them if a mutation happens. And if you</p> <p>11 want to have a higher rate of mutation, you can set the</p> <p>12 environment so that that happens at a greater frequency.</p> <p>13 If you wish, you could set it so that there are no</p> <p>14 mutations. But of course, that would be a case in which</p> <p>15 you don't have the Darwinian explanation, you don't have</p> <p>16 the Darwinian mechanism in place.</p> <p>17 Q In terms of the instantiation of Darwin's law, do the</p> <p>18 environmental parameters you just referenced purport to</p> <p>19 instantiate natural selection?</p> <p>20 A The system has natural selection arising out of the</p> <p>21 competition of the organisms. That can happen in a</p> <p>22 number of different ways. So it depends upon what you</p> <p>23 mean by the environment. It could be other organisms,</p> <p>24 they're also part of the environment once they start to</p> <p>25 replicate and grow.</p>

7 (Pages 22 to 25)



ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 26</p> <p>1 And so natural selection happens in this system in 2 the same way that it happens in the biological case 3 where organisms compete with each other for survival. 4 And that's what natural selection is. Some of them 5 don't do as well. Others that do better are more likely 6 to survive and reproduce. That's the sense in which the 7 Darwinian mechanism is exactly instantiated.</p> <p>8 Q And again, I'm just trying to get a sense for the 9 connection here. Going back to the process whereby the 10 computer organisms mutate, is that -- you've indicated 11 that that mutation is not intrinsic to the organism, 12 it's imposed from outside by the computer environment, 13 is that correct?</p> <p>14 A It's actually possible to set up experiments where the 15 mutation rate is controlled by the organism, so they 16 could actually evolve higher or lower mutation rates. 17 So depending upon the kind of experiment one wants to 18 do, you can allow that to change. But if you're not 19 interested in studying that aspect, you can just fix a 20 mutation rate. So it does depend upon the question that 21 one is asking. And we have done experiments where both 22 are done.</p> <p>23 Q And in terms of natural selection, you've indicated that 24 the organisms compete with each other, is that correct?</p> <p>25 A That's correct.</p>	<p style="text-align: right;">Page 28</p> <p>1 Q How is the randomness accounted for, how is randomness 2 made an attribute of this program you're describing?</p> <p>3 A The program simply uses a random number generator.</p> <p>4 Q And how does that affect the program's operation?</p> <p>5 A Affect it in what way?</p> <p>6 Q Well, I guess that's what I'm trying to understand. 7 Plainly, the team is trying to instantiate 8 randomness, is that correct?</p> <p>9 A It has randomness as part of the process.</p> <p>10 Q And that randomness is created by this random number 11 generator?</p> <p>12 A Correct.</p> <p>13 Q Well, let me ask it this way. And again, forgive me if 14 this is somewhat dense of me. 15 How does the randomness created by the random 16 number generator affect the computer organisms?</p> <p>17 A As the process of replication occurs, that is to say if 18 an organism successfully self-replicates, the random 19 mutations occur in the genome of the new organism, so 20 the random number generator is involved in randomly 21 picking which instruction will be mutated into what, for 22 example.</p> <p>23 Q And in terms of what the instruction will be mutated to, 24 are those other instructions that are added to replace 25 the one that is mutating?</p>
<p style="text-align: right;">Page 27</p> <p>1 Q What do they compete for?</p> <p>2 A In the end, the competition is, again, exactly like in 3 the real world, they're simply competing for survival. 4 If they do better at replicating than another organism, 5 they will out-compete it and so more offspring will be 6 produced by that organism than another one. So that's 7 one sense of -- they're just competing for space.</p> <p>8 In another sense, they're competing for energy. So 9 to execute instructions requires processing time, and if 10 they find ways of getting extra processing time, then 11 they will also do better, those will be selected for, as 12 well. And one can set up an environment that gives them 13 extra energy, extra computing time, processor time, if 14 they evolve capacities, traits. So that's a sense in 15 which, like in the real world, if they learn to do 16 something better than someone else, metabolize food, for 17 example, more efficiently, they'll do better than 18 someone who can't. In this case, the equivalent is 19 processing time. So you can set it up so that they can 20 gain extra processing time if they evolve the ability to 21 perform functions.</p> <p>22 Q It seems like at each stage, these scientists, this team 23 that's looking at the system, can adjust the parameters 24 to experiment with various scenarios, is that accurate?</p> <p>25 A Correct.</p>	<p style="text-align: right;">Page 29</p> <p>1 A In a genome, you have a sequence of instructions, in 2 this case it's actually a circular genome, but it's 3 strictly a string of instructions. What happens at 4 mutation is at any particular site there's some chance 5 that the instruction that's there will mutate to some 6 other one. There aren't new instructions, if that was 7 your question, because they're a limited instruction 8 set. So it will mutate to one of the other ones. Or 9 possibly delete an instruction and not replace it with 10 anything else. Or add an instruction.</p> <p>11 Q And how is that number of possibilities arrived at?</p> <p>12 A The number of which possibilities?</p> <p>13 Q Possible mutations.</p> <p>14 A As I said, the mutation rate can be something that one 15 sets, if you wish, or you can allow it to evolve if you 16 want to do it that way.</p> <p>17 Q How about mutation possibilities, are there any limits 18 on that?</p> <p>19 A It can't mutate to an instruction that isn't there, so 20 there are certain -- there are a limited number of 21 instructions. Again, in the same way that there are in 22 the biological case a limited number of amino acids. So 23 we're constraining the set.</p> <p>24 Q And that's what I was just trying to get a sense for. 25 Are the constraints on the instruction</p>

8 (Pages 26 to 29)

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 30</p> <p>1 possibilities designed to instantiate the constraints on 2 replication possibilities for DNA?</p> <p>3 A No. It's not meant to particularly map on to DNA except 4 in the evolutionary sense that it maps the Darwinian 5 features of the ability to replicate if you have the 6 right instruction set, the ability to do functions if 7 you have the right instruction set. But primarily, the 8 mechanism itself, the ability to mutate, inherit 9 functions if you acquire them, if you evolve them, and 10 then to compete and therefore be naturally selected, 11 that's the sense in which we're getting evolution 12 instantiated, it's not meant to specifically simulate 13 DNA in terms of its chemical properties.</p> <p>14 Q Okay. You say "right instruction set." Is that right 15 instruction set vis-a-vis the computer environment 16 that's created by the program?</p> <p>17 THE WITNESS: Could you read back what I said with 18 regard to right instruction set? I'm not sure what I 19 was referring to there.</p> <p>20 (Record repeated.)</p> <p>21 A So I think what I was referring to, correct me if you 22 had a different question in mind, was not the set of 23 instructions, per se, but the set that you have in the 24 genome, in a particular genome, the sequence that you 25 have there, it won't -- an organism won't replicate if</p>	<p style="text-align: right;">Page 32</p> <p>1 environment or ceases to thrive, is that correct?</p> <p>2 A Both of those things can happen. So if a mutation 3 occurs, that could be deleterious in different ways, it 4 could be deleterious in that it totally prevents it from 5 replicating, it could be deleterious in that it makes it 6 replicate slower, it could be deleterious in other ways, 7 as well. So what that random number generator will do 8 is unknown until it happens. And in some cases, it 9 hurts the organisms, in other cases, it helps them.</p> <p>10 Q Let me ask you, I think I know, but what is the overall 11 purpose of this particular program?</p> <p>12 MR. SCHMIDT: Of the project or the --</p> <p>13 MR. GILLEN: Yeah, the project.</p> <p>14 A The purpose of the project overall is to study 15 evolutionary processes, to test evolutionary processes, 16 hypotheses about how evolution works.</p> <p>17 BY MR. GILLEN:</p> <p>18 Q And can you be more specific? What hypotheses does it 19 test?</p> <p>20 A Hypotheses that researchers are interested in, how does 21 the evolutionary process work.</p> <p>22 Q It seems from your report that the processes, this 23 project, speaks to the viability of Behe's notion of 24 irreducible complexity, is that correct?</p> <p>25 A That's correct.</p>
<p style="text-align: right;">Page 31</p> <p>1 the sequence of instructions that it has gets mutated in 2 a way that knocks out that ability. You have -- they 3 have to be ordered in a way to allow it to replicate, 4 they have to be ordered in a particular way for them to 5 perform a function. So that's the sense in which I 6 meant it has to have the right instruction set. I 7 didn't mean to say the set of instructions out of which 8 they can mutate, that's just set.</p> <p>9 But that's not really relevant, those are just very 10 basic low-level computer instructions close to an 11 assembly line, which the key thing here is for them to 12 perform a task, it has to be a specific sequence, an 13 ordered sequence, and if mutation changes one of the 14 instructions, it could break. It happens all the time. 15 In the same way that that could happen in the biological 16 case with DNA. But again, we're not trying to simulate 17 the chemical properties of DNA, simply this evolutionary 18 mechanism.</p> <p>19 BY MR. GILLEN:</p> <p>20 Q And just let me wrap this up and see if I'm 21 understanding you.</p> <p>22 If the computer organism through the process of 23 mutations instantiated in the program is deprived of an 24 instruction necessary for it to function, it ceases to, 25 what shall I say, exist in terms of the computer</p>	<p style="text-align: right;">Page 33</p> <p>1 Q Just briefly explain how the project relates to Behe's 2 concept of irreducible complexity?</p> <p>3 A Behe makes a claim about a certain type of system which 4 he calls an irreducibly complex system and says that 5 such systems cannot evolve. Our system lets one watch 6 evolution happen, and we can watch it evolve irreducibly 7 complex systems. So what Behe says can't happen we can 8 observe happen.</p> <p>9 Q And am I correct that the program shows in your opinion 10 that irreducibly complex systems can be derived from 11 random mutation and the -- the causal mechanism of 12 random mutation and natural selection?</p> <p>13 A We can observe the Darwinian mechanism of random 14 mutation of self-replicators that are competing with 15 each other and thereby naturally selected produce 16 functional traits that are irreducibly complex at the 17 end of a run and then we can look back and see here's 18 how it happened.</p> <p>19 Q And when you use "irreducibly complex" there, what are 20 you referring to?</p> <p>21 A You're asking me about Behe's notion of irreducible 22 complexity?</p> <p>23 Q And how do you understand that concept?</p> <p>24 A Behe defines an irreducibly complex system as one that 25 requires the interaction of a number of parts, they have</p>

9 (Pages 30 to 33)

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 34</p> <p>1 to be interconnected in the right way, well matched, to  2 produce a function, such that if you remove any of those  3 parts, you lose the function.</p> <p>4 Q And in your view, this program demonstrates that you can  5 derive irreducibly complex systems from random mutation  6 and natural selection?</p> <p>7 A We can watch it happen.</p> <p>8 Q Is the same true for the way in which this project, this  9 computer science project, speaks to Dembski's concept of  10 complex specified information?</p> <p>11 A Dembski's notion of complex specified information is  12 directly related to Behe's notion of irreducible  13 complexity. Irreducible complexity is a kind of  14 specified information, at least as Dembski has  15 articulated it. Dembski says that CSI cannot be  16 produced by any mechanism, any natural mechanism, and  17 that Behe's examples are cases of that larger point. So  18 showing that irreducibly complex systems can evolve,  19 observing that in our system, not only shows that Behe  20 is wrong directly, but that Dembski's CSI is, as well,  21 with regard to its claim that such systems cannot evolve  22 through a natural process.</p> <p>23 Q And just to be sure I'm understanding you, when you say  24 "natural process," you mean random mutation and natural  25 selection, is that correct?</p>	<p style="text-align: right;">Page 36</p> <p>1 A So that's -- I mean, I think that answers your question.  2 But ask it again, please, if that didn't get it.</p> <p>3 Q I think so, too. Is it the random number generator  4 that -- well, let me ask you, does the random number  5 generator serve both as the mechanism for the mutation  6 of the organisms and their ability to thrive in the  7 environment or is there another environmental  8 constraint?</p> <p>9 A The random number generator simply produces the random  10 feature, which is simply the -- what will mutate to  11 what, and depending upon what happens, the lucky ones  12 may wind up doing something that the other ones couldn't  13 and thereby out-compete someone else and therefore be  14 naturally selected favorably, their offspring will be  15 more numerous, they'll be the ones to survive, to  16 reproduce, they're selected. There can also be things  17 in the environment such that what randomly occurs could  18 turn out to be fortuitous in giving them a trait that  19 gives them more energy, thereby letting them compete  20 more. So things come from the environment, things come  21 from the random variation, and as in any biological  22 system, those things all work together.</p> <p>23 Q And your answer points me towards the last thing I want  24 to try and get a grip on, which is how does the program  25 account for the environmental factors that produce</p>
<p style="text-align: right;">Page 35</p> <p>1 A The mechanism of the evolutionary process is random  2 mutation on self -- on replicators, it has to be a  3 heritable random variation, that is, naturally selected,  4 yes.</p> <p>5 MR. GILLEN: Do you want to take a break for a  6 second, Tom?</p> <p>7 MR. SCHMIDT: Whenever.  8 (Short recess.)</p> <p>9 BY MR. GILLEN:</p> <p>10 Q Dr. Pennock, I'm going to move on off of this topic, but  11 I just want to ask you one thing.</p> <p>12 In terms of the instruction set, who or how is that  13 created?</p> <p>14 A The original set of instructions?</p> <p>15 Q Yes.</p> <p>16 A That was put together by the original programmers back  17 when the system was set up.</p> <p>18 Q And in terms of the process of natural selection, who  19 wrote the instructions for that, or is that derived  20 ultimately from the instruction set for the organisms?</p> <p>21 A So the way that natural selection works emerges out of  22 what's going on. So the organisms are competing, and  23 some will do better than others if they randomly mutate  24 to make them better at something. So --</p> <p>25 Q Okay. I'm sorry, go ahead.</p>	<p style="text-align: right;">Page 37</p> <p>1 natural selection?</p> <p>2 MR. SCHMIDT: Object to the form.</p> <p>3 BY MR. GILLEN:</p> <p>4 Q And let me give you an example and see if I can be more  5 specific. I had a discussion with Kevin Padian, one of  6 the other experts in the case, in which he was  7 explaining natural selection, among other things, as  8 arising from environmental factors, and he gave what I  9 think is a fairly standard example of different herds of  10 animals threatened by different kinds of predators and  11 the notion that, for example, the faster of the herd of  12 antelopes, for example, will have a greater opportunity  13 to advance or elude the predators, and therefore, that  14 swiftness is likely to be passed on because, as you say,  15 it's advantageous. I'm just trying to understand the  16 way in which this program instantiates those  17 environmental factors.</p> <p>18 Would you please explain that to me?</p> <p>19 A It can instantiate them in any number of ways. Let me  20 just -- so let me just give you the simplest one,  21 similar to the example that you gave of being faster.  22 So the organisms self-replicate. It's not something  23 that's done from without, like a copy/paste, you know.  24 on your word processor, they have to have a sequence of  25 instructions that through that specific sequence makes a</p>

10 (Pages 34 to 37)

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 38</p> <p>1 new organism. When random mutation changes one of the</p> <p>2 instructions, one of the things that it could change</p> <p>3 would be instructions that are related to</p> <p>4 self-replication. There's not just one way to</p> <p>5 self-replicate, we don't write in that it can only be</p> <p>6 done this way, it can mutate, and it can mutate such</p> <p>7 that it can't self-replicate, so they die. Or it could</p> <p>8 mutate in such a way that it replicates faster or</p> <p>9 slower. Put it in an instruction here, it could take</p> <p>10 longer to replicate, put a different instruction a</p> <p>11 different place or they're rearranged over time, it can</p> <p>12 take more or less time. That's a sense in which they</p> <p>13 can get faster or slower relative to each other, like in</p> <p>14 the case that you were mentioning, and thereby in</p> <p>15 competition with each other be naturally selected.</p> <p>16 Those that randomly got instructions that hurt</p> <p>17 their ability to replicate may be too slow relative to</p> <p>18 someone else who got -- who evolved to replicate faster.</p> <p>19 Those ones will then wind up out-competing. That's what</p> <p>20 natural selection is, is the automatic process there.</p> <p>21 And that's how natural selection will preferentially</p> <p>22 select for this new ability, this faster replication.</p> <p>23 Q Let me ask you a little bit about some of the</p> <p>24 associations that you have as a professional.</p> <p>25 The Society for the Study of Evolution, what,</p>	<p style="text-align: right;">Page 40</p> <p>1 Q Does part of the work of the committee consist in</p> <p>2 addressing intelligent design theory or, as you call it,</p> <p>3 intelligent design creationism?</p> <p>4 A That would be one of the public affairs functions. So</p> <p>5 if there's a need to have a response on some creationist</p> <p>6 flare-up, that would be one thing the committee would</p> <p>7 do, yes.</p> <p>8 Q And I think I know, but generally speaking, a response</p> <p>9 would be to discourage incorporation of introducing that</p> <p>10 sort of subject matter into biology instruction?</p> <p>11 A That would be fair to say.</p> <p>12 Q How about a founder of Michigan Citizens for Science,</p> <p>13 you founded that organization?</p> <p>14 A I was one of the founders of that.</p> <p>15 Q Who else?</p> <p>16 A There were some other Michigan State University</p> <p>17 professors who got involved early on, not really as</p> <p>18 founders, and Ed Brayton, who is a businessman, he and I</p> <p>19 were the two initial co-founders.</p> <p>20 Q Let me ask you, are any of the other experts in this</p> <p>21 case to your knowledge members of the Society for the</p> <p>22 Study of Evolution?</p> <p>23 A Any of the witnesses, expert witnesses?</p> <p>24 Q Yeah, the expert witnesses?</p> <p>25 A I don't know.</p>
<p style="text-align: right;">Page 39</p> <p>1 generally speaking, is the work of that society?</p> <p>2 A It's a professional scientific organization for</p> <p>3 biologists, for evolutionary biologists.</p> <p>4 Q And when you say evolutionary biologists, I just want to</p> <p>5 make sure I understand that, is that biologists who</p> <p>6 subscribe to the neo-Darwinian synthesis as it's called?</p> <p>7 A It's just a society of people who do research on</p> <p>8 evolution.</p> <p>9 Q Do you have any position with that organization?</p> <p>10 A I'm a member of the -- one of the national committees.</p> <p>11 Q Which one is that?</p> <p>12 A The education committee. I've served as just a member</p> <p>13 for five years now. I don't know exactly, that's on my</p> <p>14 CV. And starting in July, I'll be chair of that</p> <p>15 committee.</p> <p>16 Q And what's the purpose of that committee?</p> <p>17 A Its function is to put on programs, educational</p> <p>18 programs, for the national meetings, for professors, for</p> <p>19 teachers to help them better teach evolution in their</p> <p>20 classes. We also have a web site, so some of the</p> <p>21 members work on that. We also work on encouraging</p> <p>22 minority students, their interest in science. And we</p> <p>23 also do some things on public affairs.</p> <p>24 Q Do you have a salary?</p> <p>25 A No.</p>	<p style="text-align: right;">Page 41</p> <p>1 Q Okay. How about founder of Michigan Citizens for</p> <p>2 Science, is anyone else who is an expert in this case a</p> <p>3 member of Michigan Citizens for Science?</p> <p>4 A I don't believe so.</p> <p>5 Q What's your position there at Michigan Citizens for</p> <p>6 Science?</p> <p>7 A I'm currently the president of the advisory board.</p> <p>8 Q Do you get a salary?</p> <p>9 A No.</p> <p>10 Q In your report, you mention two instances lately where</p> <p>11 you dealt with -- I'm looking at I think it's page 8,</p> <p>12 yeah, page 8, you say I have dealt with two school</p> <p>13 districts in Michigan.</p> <p>14 A I'm looking at that that you passed me now.</p> <p>15 Q I just want to get a sense for the nature of your</p> <p>16 involvement in those instances.</p> <p>17 Were there just two recent cases there?</p> <p>18 A Yes. I'm mentioning two that are current in the state.</p> <p>19 Q And where were they taking place?</p> <p>20 A One of them is in the Gull Lake Independent School</p> <p>21 District. And the other is in Rochester Hills.</p> <p>22 Q And what has been the nature of your involvement in Gull</p> <p>23 Lake?</p> <p>24 A I have consulted, been a consultant with administrators</p> <p>25 in the district to help them respond to the case, and I</p>

11 (Pages 38 to 41)



ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 42</p> <p>1 also organized an in-service day workshop for biology 2 teachers there. And the group, Michigan Citizens for 3 Science, as a citizens action group works to encourage 4 administrators, policy makers, to support the integrity 5 of science, science education.</p> <p>6 Q And how about Rochester -- well, let me ask you, Gull 7 Lake involves teachers who are trying to present 8 intelligent design in their classes?</p> <p>9 A That's correct.</p> <p>10 Q And I take it it is true that you have encouraged the 11 administrators to prevent that?</p> <p>12 A That's correct.</p> <p>13 Q And in Rochester Hills, what's the situation there?</p> <p>14 A It's a similar case where in this case one teacher is 15 including intelligent design creationism and we're 16 assisting a parent who called us, called me, to ask for 17 help in complaining about that. The same is true of the 18 other case, it was initially a parent who contacted me.</p> <p>19 Q And again, Rochester Hills, have you been a consultant 20 with the administration?</p> <p>21 A Not to this point, just with the parent.</p> <p>22 Q And generally speaking, what are your efforts in 23 Rochester Hills directed at?</p> <p>24 A What we've done so far is simply provide information, 25 resources, materials, advice to the parent.</p>	<p style="text-align: right;">Page 44</p> <p>1 copy of your report as Exhibit 1. 2 (Exhibit Number 1 was marked for identification.)</p> <p>3 BY MR. GULLEN:</p> <p>4 Q There's a couple -- well, there are many things I'd 5 like to ask you about just to get a better 6 understanding, if I can. In your report, you refer 7 to the intelligent design movement, is that correct, 8 page 3? Roman heading III.</p> <p>9 A Yes.</p> <p>10 Q And I just want to get a sense for how you define the 11 movement and who you see as speaking for it. Give me 12 your explanation for that, Dr. Pennock, how do you 13 define the intelligent design movement?</p> <p>14 A The intelligent design movement is a group of activists 15 who are working, who have been working for many years to 16 challenge the teaching of evolution, to challenge 17 evolutionary science, and to put in place what they call 18 an alternative account, an alternative theory, into the 19 schools.</p> <p>20 Q And what is -- I take it the alternative theory is 21 intelligent design theory?</p> <p>22 A Over the years, the terminology has shifted somewhat, 23 but that's the dominant terminology now, design theory, 24 intelligent design.</p> <p>25 Q You say that the terminology has shifted somewhat.</p>
<p style="text-align: right;">Page 43</p> <p>1 Q And what is the goal towards which your help is 2 oriented, what are you trying to secure there?</p> <p>3 A Our general goal is always to defend sound science 4 education. In this particular case, our goal is to help 5 the parent, to provide her with the information so that 6 she can pursue her concern.</p> <p>7 Q And I see that you're on the national advisory board for 8 Americans United for Separation of Church and State?</p> <p>9 A Yes, that's right.</p> <p>10 Q How did you come to be involved in that organization?</p> <p>11 A I was asked if I would be interested in serving on the 12 board.</p> <p>13 Q When was that?</p> <p>14 A About a year ago, I think, maybe a little longer.</p> <p>15 Q Who asked you?</p> <p>16 A I think her name was Moleen Matsumura, I think.</p> <p>17 Q Is she with the organization?</p> <p>18 A Yes.</p> <p>19 Q Did she say why she was soliciting your membership?</p> <p>20 A Because of my expertise with regard to creationism and I 21 assume because of my support of the goals of the 22 organization.</p> <p>23 Q Do you have any salary through that?</p> <p>24 A No.</p> <p>25 Q Just for purposes of the deposition, I'd like to mark a</p>	<p style="text-align: right;">Page 45</p> <p>1 What do you see as the terminology that existed 2 prior to the shift to design theory?</p> <p>3 A In early meetings and writings, the terminology was more 4 variable. In some cases, they talked about origin 5 science, sometimes they would talk about explicitly just 6 creationism, sometimes talk about in one case 7 Creascience, in some cases the creation hypothesis, in 8 some cases the God hypothesis. A variety of terms have 9 been used.</p> <p>10 Q It seems in your answer you're referring to different 11 people who have used these terms. Do you know whether 12 any of the experts for the defendants in this case have 13 used those terms? Let's go through them.</p> <p>14 Origin science?</p> <p>15 A So you'll have to remind me now of who actually is an 16 expert and who is not.</p> <p>17 Q That's fine. Let's look at Michael Behe, do you know if 18 he's used the term "origin science"?</p> <p>19 A I don't know if he's used that specific term. He has 20 referred to origins research, I believe.</p> <p>21 Q How about creationism?</p> <p>22 A Those terms have been used broadly. I'd have to find 23 specific -- I could look up specific cases if you wish.</p> <p>24 I think I have a number of cases mentioned in my report.</p> <p>25 Q And let me go about it a different way, perhaps.</p>

12 (Pages 42 to 45)



ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 46</p> <p>1 You have a reference in page 3 to core leaders, and</p> <p>2 I just want a sense for how you determined who could be</p> <p>3 properly classified as core leaders of the intelligent</p> <p>4 design movement?</p> <p>5 A The core group, what I call the core leaders, have been</p> <p>6 a half dozen or so figures who have been involved pretty</p> <p>7 much from the beginning of what they call the movement,</p> <p>8 the coming together of the movement, and who are</p> <p>9 referred to by others for their leadership role in the</p> <p>10 movement. It's an amorphous group in the sense that</p> <p>11 they will explicitly say that this is not a formal</p> <p>12 organization and that there are a wide range of people</p> <p>13 who are included as leaders, as members. So sometimes</p> <p>14 they will refer to themselves as nominal leaders,</p> <p>15 recognizing that others are involved, as well.</p> <p>16 Q It seems that in your report, there's evidence that on a</p> <p>17 number of issues, for example, common descent, persons</p> <p>18 that you associate with intelligent design theory differ</p> <p>19 with respect to their views on that topic, for example,</p> <p>20 common descent, is that true?</p> <p>21 A The members of the ID movement including what I call the</p> <p>22 core leadership do differ on their view, their stated</p> <p>23 view, on common descent.</p> <p>24 Q And in such a case where the individual adherents</p> <p>25 differ, who or how do you determine what the movement</p>	<p style="text-align: right;">Page 48</p> <p>1 Q Let me ask it another way.</p> <p>2 It seems that different persons placed within the</p> <p>3 intelligent design movement, as you call it, have</p> <p>4 different views as to what intelligent design theory</p> <p>5 requires?</p> <p>6 A Different members of the group hold different specific</p> <p>7 views with regard to particular points, and the movement</p> <p>8 overall intentionally embraces the variety and</p> <p>9 explicitly does so. So I wouldn't say that that's to</p> <p>10 say that there's a different interpretation about what</p> <p>11 the view is, but rather, there's general agreement that</p> <p>12 a wide range of views are included under that heading.</p> <p>13 Q But different proponents of the theory differ on</p> <p>14 specific points such as common descent?</p> <p>15 A Different members of the group go different ways on</p> <p>16 that.</p> <p>17 Q Let me just ask you for the sake of my edification, is</p> <p>18 that really different from evolutionary biologists?</p> <p>19 A Could you be -- in what different --</p> <p>20 Q Well, it seems to me that different adherents of</p> <p>21 evolutionary biology likewise take different positions</p> <p>22 on a number of specific points, is that correct?</p> <p>23 A In evolutionary biology, there are unanswered questions</p> <p>24 for which different people will take different</p> <p>25 hypotheses and -- so yes, there are all sorts of</p>
<p style="text-align: right;">Page 47</p> <p>1 holds?</p> <p>2 A The way in which intelligent design creationists write,</p> <p>3 discuss their views, indicate that the range of</p> <p>4 positions is properly included under that heading.</p> <p>5 Q So I just want to make sure I understand you.</p> <p>6 If individual adherents differ on this, that, or</p> <p>7 the other point, you might still class them as</p> <p>8 intelligent design creationists as you call them based</p> <p>9 on your understanding of how they define themselves?</p> <p>10 A My reference has always been to the things that they</p> <p>11 have written themselves in the literature and have said</p> <p>12 in speeches or talks or interviews. With regard to what</p> <p>13 one would teach if one teaches intelligent design, they</p> <p>14 have explicitly said we disagree among ourselves with</p> <p>15 regard to common descent, for example, and that</p> <p>16 disagreement, those different views, would properly be</p> <p>17 included, should not be excluded. So all of those kinds</p> <p>18 of things are what I'm drawing upon in saying here's</p> <p>19 what's included under that general heading.</p> <p>20 Q So then it seems that intelligent design theory is,</p> <p>21 shall I say, is susceptible to a variety of</p> <p>22 interpretations in the eyes of different proponents of</p> <p>23 the theory, is that correct?</p> <p>24 MR. SCHMIDT: Object to the form.</p> <p>25 BY MR. GILLEN:</p>	<p style="text-align: right;">Page 49</p> <p>1 disagreements within the field that are under research,</p> <p>2 all of which are part of evolutionary biology.</p> <p>3 Q On page 4 of your report, you mention that you will</p> <p>4 not -- this is at the end of that paragraph, the</p> <p>5 carryover paragraph, the last sentence, "I will not base</p> <p>6 my opinion upon any assessment of ID creationists'</p> <p>7 religious motivations or their connections with</p> <p>8 religious organizations, but will confine my analysis to</p> <p>9 their substantive claims." And I just want to make sure</p> <p>10 I appreciate the significance of your observation there.</p> <p>11 It seems to me it's an acknowledgment that the</p> <p>12 religious motivations are not the criteria that can be</p> <p>13 used to determine whether a theory is scientific, is</p> <p>14 that correct?</p> <p>15 A No, that's not my purpose here. I was simply pointing</p> <p>16 out that my material that I would draw upon, the</p> <p>17 evidence that I would give, would leave those things out</p> <p>18 and that I would focus just on the content because I've</p> <p>19 got sufficient to draw the conclusion that's in my</p> <p>20 opinion. As I alluded to here, I think those could have</p> <p>21 been brought in as relevant, but I didn't do so at this</p> <p>22 time.</p> <p>23 Q Well, let me ask you to make sure I understand you, do</p> <p>24 you think that the religious motivations of an</p> <p>25 individual scientist would determine whether his work</p>

13 (Pages 46 to 49)

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 50</p> <p>1 was scientific?</p> <p>2 A In order to understand the meaning of a thesis, in order</p> <p>3 to understand what someone is saying, I think you do</p> <p>4 properly appeal to their motivation, their mental view</p> <p>5 of things, and so that it is sometimes appropriate to</p> <p>6 inquire about that as a way of understanding the</p> <p>7 content, it can shed light upon the meaning of the</p> <p>8 thesis.</p> <p>9 Q Concretely, do you think that a theory would be properly</p> <p>10 classified as not scientific if a proponent of that</p> <p>11 theory discussed its metaphysical implications?</p> <p>12 MR. SCHMIDT: Could you read that question again?</p> <p>13 A Yeah, I was about to ask that myself.</p> <p>14 (Record repeated.)</p> <p>15 A As a philosopher, one always looks at the content of</p> <p>16 what is being said, and to answer that, I think you'd</p> <p>17 have to look at the specific thing that was being said.</p> <p>18 In some cases, I think you would have to look at the way</p> <p>19 the claim was connected to metaphysical implications,</p> <p>20 and then that would be relevant. So it's not just</p> <p>21 a -- I don't think one could give sort of a simple yes</p> <p>22 or no to scientific/not scientific on the basis of that,</p> <p>23 you'd have to look specifically at what the claims are,</p> <p>24 how are these things connected.</p> <p>25 BY MR. GILLEN:</p>	<p style="text-align: right;">Page 52</p> <p>1 circumstances which I would think that that's relevant.</p> <p>2 Q Give me a sense for those circumstances, what are the</p> <p>3 circumstances in which you believe the religious motive</p> <p>4 of an individual would determine whether or not their</p> <p>5 inquiry was scientific?</p> <p>6 A The way in which terms are understood are a reflection</p> <p>7 of one's mental belief state, I intend to see the world</p> <p>8 in such and such a way, I intend to glorify God in this</p> <p>9 way, I intend to -- all of those motives I'm</p> <p>10 interpreting broadly, so it's sort of the mental view of</p> <p>11 the world. If one is putting forward propositions</p> <p>12 purported to be science, those sorts of motives, I</p> <p>13 think, can help one understand the content of those</p> <p>14 claims.</p> <p>15 Q Anything else on that school, any other circumstances?</p> <p>16 A That was an example. I could think of other --</p> <p>17 Q I guess what I'm trying to get at here, Dr. Pennock, is</p> <p>18 whether or not the individual motivations of the</p> <p>19 scientist can make non-science science? Or to ask it</p> <p>20 the other way, can the individual motivations of the</p> <p>21 scientist make science non-science in your opinion?</p> <p>22 MR. SCHMIDT: Let me object to what appears to be</p> <p>23 presented as a double question. What you've done, if I</p> <p>24 understand it -- well, I'll put it this way. Are you</p> <p>25 just asking the second question, can motives make --</p>
<p style="text-align: right;">Page 51</p> <p>1 Q Let me see if I can ask you a different way.</p> <p>2 Does a theory become scientific or not depending on</p> <p>3 whether it is consistent with a certain religious</p> <p>4 belief?</p> <p>5 A So the focus there is on mere consistency with, I</p> <p>6 believe?</p> <p>7 Q Yes, let's start there.</p> <p>8 A And that's not -- that's not going to be relevant</p> <p>9 to -- by itself to whether something is science or not.</p> <p>10 Q Does a theory become scientific or not based on whether</p> <p>11 the proponent has discussed its consistency with</p> <p>12 religious beliefs?</p> <p>13 A Again, if the discussion is merely is this consistent or</p> <p>14 not with something, that does not make it -- that would</p> <p>15 not be something that draws the line between whether</p> <p>16 it's science or not. ....</p> <p>17 Q Does a theory become scientific or not depending on</p> <p>18 whether the scientist has a religious motive?</p> <p>19 MR. SCHMIDT: In what?</p> <p>20 BY MR. GILLEN:</p> <p>21 Q In inquiring into nature?</p> <p>22 A So I'm not sure how this is different from that earlier</p> <p>23 question about the motives of -- because I said under</p> <p>24 certain circumstances, motives are relevant in that they</p> <p>25 help one understand the content, and so there would be</p>	<p style="text-align: right;">Page 53</p> <p>1 MR. GILLEN: Science non-science.</p> <p>2 MR. SCHMIDT: What's presented as science</p> <p>3 non-science?</p> <p>4 MR. GILLEN: Yeah.</p> <p>5 MR. SCHMIDT: Okay.</p> <p>6 A So the question itself to my mind seems to presume</p> <p>7 something that I guess I don't either understand or</p> <p>8 agree with. Because my point had to do with looking at</p> <p>9 the content of what's put forward. And if the content</p> <p>10 is such, and one learns of the content in part by</p> <p>11 looking at the person's beliefs, if the content is such</p> <p>12 that it isn't science, it's not that it makes science</p> <p>13 not science because it wasn't science to begin with.</p> <p>14 Does that answer your question?</p> <p>15 BY MR. GILLEN:</p> <p>16 Q No, but it's -- it may be because I'm asking it in the</p> <p>17 wrong way. When I read page 4 of your report, I see</p> <p>18 that you're saying you're not going to look at the</p> <p>19 religious motivations of ID creationists as you call</p> <p>20 them.</p> <p>21 What I'm trying to determine here is whether or not</p> <p>22 you believe the subjective motivations of the individual</p> <p>23 scientist can disqualify, can rule their inquiry out of</p> <p>24 science?</p> <p>25 A And my answer was that one has to look at the content of</p>

14 (Pages 50 to 53)

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 54</p> <p>1 what's being put forward and that that content in some 2 cases can only be understood, the meanings of the terms 3 can only be understood, for example, by knowing 4 something about judging the person who's advocating it, 5 what their motives are, what their belief states are. 6 And in those cases, it is something that you could say 7 this is disqualified. 8 Q Let me just ask you maybe a more specific historical 9 question and see if I can get at this. 10 If Isaac Newton is engaged in scientific inquiry 11 for the purpose of trying to understand what he believes 12 to be the laws of God's creation, does that mean that 13 his inquiry is not science because his motive is to 14 understand God's laws of nature? 15 A So that's a nice example in that it's now specific, and 16 my general point had to do with there are some cases in 17 which it's relevant, some cases which it might not be, 18 and you have to look at the specifics to see. 19 So in this case you've told me, at least by 20 example, whether this is true or not isn't relevant now, 21 but if it were the case that for Newton, here's his only 22 motivation, to understand God's laws, the content now of 23 what he puts forward, Newton's laws, don't change in 24 content with regard to this particular motivation. The 25 assumption here is these are laws, God created them,</p>	<p style="text-align: right;">Page 56</p> <p>1 changing because of religious motives? 2 A In the same way, look at what's been written, look at 3 the actions, look at the writings and behaviors and 4 expressions, see what that tells with regard to the 5 propositions. 6 Q And again, I'm just trying to understand your view on 7 this here. 8 If, for example, in your opinion, if Darwin sought 9 to find natural explanations for biological diversity 10 because he did not believe in God, would that rule out 11 his theory as science? 12 A So let's see if I have this right. If he sought to find 13 natural laws because he didn't believe in God, would 14 that rule it out as science? 15 Q Right. 16 A Okay. So again, this is a hypothetical example. 17 Q Yes. 18 A It doesn't apply to Darwin in particular, that 19 wasn't -- 20 Q Right, I'm just trying to understand your view on this. 21 A The notion -- if the notion of natural law is the 22 ordinary scientific notion, then his disbelief in God, 23 if that had been the case, wouldn't have made a 24 difference to the content as far as I can tell. 25 Q And why is that?</p>
<p style="text-align: right;">Page 55</p> <p>1 fine, I want to find out about them. But the content of 2 the law doesn't change in relationship to that 3 motivation, at least as I understand the way you're 4 putting it. 5 Q So is the motive of the scientist relevant in cases 6 where the content of the theory changes based on 7 religious motives? 8 A If the scenario were different, if Newton's beliefs 9 about God were such that it did change the content of 10 his view, then that could be something where you'd say 11 this just isn't science. 12 Q How do you determine the motives of the scientist in 13 your judgment? 14 A So I take that to be a general question about how one 15 determines anyone's motives. It's always a question as 16 to whether one is acting qua scientist or whatever, so 17 the more general issue is not is this person a 18 scientist, but what are this person's motives? 19 Q Right. 20 A So I judge motives in the same way I think anyone else 21 does, which is by reference to things people have said, 22 things people have written, actions that they've taken, 23 behaviors, in relationship to other things I already 24 know with regard to motives and purposes. 25 Q How do you determine whether the content of a concept is</p>	<p style="text-align: right;">Page 57</p> <p>1 A Because as I understood the way you put it, what he's 2 doing is investigating, researching natural law-like 3 processes in the ordinary scientific sense of that. And 4 certainly scientists can believe or not believe in God, 5 as many of them do. 6 Q So is it the focus on natural processes which preserves 7 the inquiry from question based on the motives of the 8 scientist? 9 A I was just responding to this particular case, and for 10 that one, it didn't seem to me as though the theistic 11 belief state that you gave affected the content of the 12 investigation. 13 Q And how did you reach that conclusion? 14 A Simply on the basis of the hypothetical example that you 15 gave. If that's the presumption, that it's a search for 16 natural laws in the ordinary sense, that's the key 17 relevant feature here for this case. 18 Q Again, just trying to understand this paragraph of your 19 report on page 4 here, you also indicated that you were 20 not going to look at the affiliations of ID 21 creationists, as you call them, with religious 22 organizations. 23 Do you believe that connections with religious 24 organizations are sufficient to rule an inquiry out of 25 the realm of science?</p>

15 (Pages 54 to 57)

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 58</p> <p>1 A So the key term there is, is it a sufficient condition</p> <p>2 to rule it out as science if there's some connection to</p> <p>3 a religious organization, and there I would say no.</p> <p>4 Q Do you believe that religious affiliations are relevant</p> <p>5 to whether or not a given theory is scientific?</p> <p>6 A They could potentially be relevant in the same way that</p> <p>7 we discussed before, if they are things that in a</p> <p>8 particular case are revealing about the nature of what's</p> <p>9 being put forward, if they tell you something about the</p> <p>10 content. It's not as though they would inevitably do</p> <p>11 that, so it's not sufficient to do it, but there could</p> <p>12 be cases in which it could be relevant.</p> <p>13 Q Give me an example just so I can understand?</p> <p>14 A In just the same way as before, if this is something</p> <p>15 where something about those connections lets us</p> <p>16 understand the meaning of what's being put forward, that</p> <p>17 then can tell you something about the nature of the</p> <p>18 content of the claims. So if that's the case, then this</p> <p>19 would be something where it could be relevant.</p> <p>20 Q Well, let's look at that in terms of evolutionary</p> <p>21 theory. What religious affiliations do you see as</p> <p>22 determining whether or not evolutionary theory is</p> <p>23 scientific, are there any, do you see any religious</p> <p>24 affiliations as relevant to whether or not evolutionary</p> <p>25 biology as you understand it is scientific?</p>	<p style="text-align: right;">Page 60</p> <p>1 about what you mean. The fact that they use the term</p> <p>2 isn't enough to say that they're doing evolutionary</p> <p>3 biology. So it's a matter of asking them more</p> <p>4 specifically what do you really mean by this? So</p> <p>5 potentially, there could be such cases.</p> <p>6 BY MR. GILLEN:</p> <p>7 Q And I think I do understand you more. And I don't want</p> <p>8 to belabor this point.</p> <p>9 Is the explanation or answer you just gave me, is</p> <p>10 that connected with the portion of your report which</p> <p>11 relates to the way in which terms are used? In other</p> <p>12 words, there's a portion of your report here, and it's</p> <p>13 Section 4.3, where you say IDCs define key terms in</p> <p>14 unscientific ways.</p> <p>15 A Can you give me the page?</p> <p>16 Q Page 14, certainly. And my question to you is we've</p> <p>17 just had a discussion of motives and religious</p> <p>18 affiliations and you've discussed ways in which either</p> <p>19 might bear on the use of terminology. Is this</p> <p>20 Section 4.3 of your report what you were getting at,</p> <p>21 Dr. Pennock?</p> <p>22 A As I said in that earlier section that we were talking</p> <p>23 about, I wasn't in my report going to relate this to</p> <p>24 motivations or affiliations and so on, even though it</p> <p>25 could have been relevant. So what I have here in 4.3</p>
<p style="text-align: right;">Page 59</p> <p>1 MR. SCHMIDT: Object to the form.</p> <p>2 A So here the question would be is there something</p> <p>3 where -- maybe I just have to ask you to say that again,</p> <p>4 ask that again --</p> <p>5 MR. GILLEN: Okay.</p> <p>6 A -- in a different way.</p> <p>7 (Record repeated.)</p> <p>8 BY MR. GILLEN:</p> <p>9 Q And let me go back and just ask you this question,</p> <p>10 Dr. Pennock, because that's true, it's unclear.</p> <p>11 Do you see any religious affiliations as relevant</p> <p>12 to whether or not evolutionary biology as you understand</p> <p>13 it is scientific?</p> <p>14 MR. SCHMIDT: Same objection.</p> <p>15 A So as I understand evolutionary biology, it is put in</p> <p>16 such a way generally such that it does not have that</p> <p>17 kind of content. If there's someone who were to say I'm</p> <p>18 talking about, quote, evolutionary biology, but because</p> <p>19 of some religious connection that they have that makes</p> <p>20 you think, wait a second, you're not actually talking</p> <p>21 about evolutionary biology in the sense that we</p> <p>22 understand it, you're thinking of that in a different</p> <p>23 way, again, I'm trying to think of a hypothetical</p> <p>24 situation, that might be a case in which we would say</p> <p>25 that's relevant, we now have to ask a little bit more</p>	<p style="text-align: right;">Page 61</p> <p>1 doesn't explicitly rely upon that, but could have, I</p> <p>2 could have had an additional section to say here's why</p> <p>3 we have further evidence to understand the way in which</p> <p>4 they're putting these terms and bringing those -- that</p> <p>5 other information as relevant to that. But I didn't</p> <p>6 think that that was necessary to do.</p> <p>7 Q Are religious affiliations relevant to whether a theory</p> <p>8 is properly categorized as science apart from the way in</p> <p>9 which religious affiliations might shed light on the</p> <p>10 meaning of terms used by the individual?</p> <p>11 A Are there any other ways in which it could be relevant?</p> <p>12 Q In your opinion.</p> <p>13 A I could imagine other kinds of cases in which it might</p> <p>14 be relevant, but those aren't what I would refer to.</p> <p>15 What I meant in my comment really had to do with how</p> <p>16 this is illuminating of the content. So you're focusing</p> <p>17 on meanings of terms, so that's one of them, it's</p> <p>18 probably the primary one. But of course, it's not just</p> <p>19 meanings of terms, it's meanings of propositions, so</p> <p>20 terms are part of those. So terms and their</p> <p>21 relationships. Essentially, statements on the content</p> <p>22 of the view.</p> <p>23 Q And I'm just struggling to determine the relationship</p> <p>24 between the two here.</p> <p>25 What if, for example, the proponents of</p>

16 (Pages 58 to 61)



ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 62</p> <p>1 evolutionary biology believe that it points towards the 2 nonexistence of God, is that relevant to whether 3 evolutionary biology is science?</p> <p>4 A Could you just get the phrasing read back to me again? 5 I think it's the second part of that I wasn't clear 6 about. 7 (Record repeated.)</p> <p>8 A Okay. So again, this would be something where one looks 9 at particular cases. And I'm interested — my point had 10 to do with whether information about motives, 11 information about religious connections, in this case 12 you're pointing to, I take it, like an atheistic belief, 13 whether that's relevant to. So in this case, I would 14 say potentially yes. And again, you'd have to look at a 15 specific case. But if someone has built in and your 16 understanding of their atheistic beliefs is such that it 17 helps you learn about that, that they're building into 18 the concept a metaphysical rejection of God, they're 19 building their atheism into it, then I would say yes, 20 that would be something that would disqualify it.</p> <p>21 BY MR. GILLEN:</p> <p>22 Q How would you know if a metaphysical concept was being 23 built into a scientific theory as opposed to 24 extrapolated from it? 25 A Again, I would say that one does this in the way that we</p>	<p style="text-align: right;">Page 64</p> <p>1 revealing of the intended meaning of the claims. And in 2 those cases, you're learning something about the 3 content, and that could tell you in this case it does 4 disqualify it as science.</p> <p>5 Q Based on nothing more than the subjective motive of the 6 individual?</p> <p>7 MR. SCHMIDT: Object to the form.</p> <p>8 A So again, the way I tried to explain this, and let me 9 try to put it maybe in a different way, so it's not as 10 though I said nothing more than their subjective motive, 11 it's that their motives, their beliefs, their religious 12 connections and things can help one understand the 13 content of the claim, and there are circumstances in 14 which that can reveal that the content is not 15 scientific.</p> <p>16 BY MR. GILLEN:</p> <p>17 Q Give me an example of such circumstances?</p> <p>18 A I'll have to give you a hypothetical example just to try 19 to make something as clear as I can on short notice 20 here.</p> <p>21 Q Sure.</p> <p>22 A So one can imagine a conversation that one has with an 23 interlocutor and you're talking about gravity, and you 24 go back and forth speaking about Newton's laws and 25 gravitational attraction and so on, and you might think</p>
<p style="text-align: right;">Page 63</p> <p>1 talked about before, you understand what someone is 2 saying, the content of their utterances, in part by 3 understanding their beliefs. So this has to be done on 4 a case-by-case basis. But you look carefully at what 5 they've written, at what they've said. All of these 6 things will let you elucidate the content of their 7 claims.</p> <p>8 Q Is the subjective motive of the individual determinative 9 of whether their inquiry is science, I guess is what I'm 10 asking you? Is the subjective motive of the individual 11 determinative of whether their endeavor is properly 12 characterized as scientific?</p> <p>13 A So I think I answered this in an earlier question in the 14 sense that it's not sufficient, but that one has to look 15 at particular cases, and in certain cases, it would be. 16 You'd say from what I know about this, it lets me know 17 that what you're talking about isn't science.</p> <p>18 Q And that's all I'm trying to understand. Give me an 19 example of a case in which that would be — well, let me 20 see if I understand your answer.</p> <p>21 Are you saying that the subjective motives in and 22 of themselves are never sufficient to disqualify an 23 inquiry as scientific?</p> <p>24 A No, I didn't say that they were never sufficient. That 25 they are sometimes, because in certain cases they are</p>	<p style="text-align: right;">Page 65</p> <p>1 that this person is talking about a scientific view 2 because you're taking it to be terminology that you're 3 used to, you think that you're speaking in a scientific 4 context, but then you learn that this person that you're 5 speaking with is a member of — I actually don't know 6 the name of the group, but there actually is such a 7 group, a religious group, that holds that meditation and 8 proper spiritual preparation allows levitation. That 9 knowledge will make you reassess — should make you 10 reassess the conversation that you've just had about 11 gravity because you now realize that when they talk 12 about gravity holding one down and so on, they're not 13 speaking about this in the ordinary sense of the term, 14 that they must have something very different in mind 15 that would allow them to think that this proper 16 preparation allows someone to levitate.</p> <p>17 So that's a case in which one — and it could have 18 just been understanding some more about their belief 19 states, their motives and so on from other things that 20 they've said or written or it could be that you realize 21 that, oh, they're a member of this group and I know 22 something about that group from their writings, and that 23 then lets you reinterpret the conversation that you had 24 that you thought was scientific but now you realize 25 isn't. And now you've got to go from square one again</p>

17 (Pages 62 to 65)



ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 66</p> <p>1 and say, okay, this isn't science, what are we talking 2 about.</p> <p>3 Q Okay. I think I have a better understanding of what 4 you're getting at now.</p> <p>5 MR. GILLEN: Do you want to break for lunch, Tom?</p> <p>6 MR. SCHMIDT: It's twenty after twelve.</p> <p>7 THE WITNESS: Oh, yes, please.</p> <p>8 (Deposition recessed for lunch at 12:18 p.m.)</p> <p>9 * * *</p> <p>10 (Deposition resumed at 1:16 p.m.)</p> <p>11 BY MR. GILLEN:</p> <p>12 Q Dr. Pennock, at this point I would like to ask you to 13 define some terms for me because as I read these 14 reports, sometimes I find it difficult.</p> <p>15 When you use the term "evolution," what does that 16 refer to?</p> <p>17 A Evolution as I use it refers to the hypotheses, the 18 confirmed hypotheses, the proposed hypotheses as 19 scientists use them discussing biological organisms and 20 how they came to be.</p> <p>21 Q And just give me a little detail. What is your 22 understanding of how biologists believe biological 23 organisms came to be?</p> <p>24 A The central components of evolutionary theory involve 25 what's sometimes called the common descent thesis or the</p>	<p style="text-align: right;">Page 68</p> <p>1 before me, certainly others use the term "creationism," 2 as they did, and — but that particular phrase, I don't 3 know if I was the first to coin that or not. I somehow 4 doubt it, but it's possible.</p> <p>5 Q Understood. Let me ask you this. I know in some 6 measure, your grouping under the heading intelligent 7 design movement is, as you say, intended to reflect the 8 way in which proponents of intelligent design theory 9 describe themselves, is that correct?</p> <p>10 A That my —</p> <p>11 Q That you use the term "intelligent design," if I 12 understood your testimony this morning correctly, to 13 describe those who have -- describe themselves in that 14 term or as proponents of that theory?</p> <p>15 A You're referring to the question this morning about what 16 do I include in intelligent design movement?</p> <p>17 Q Right.</p> <p>18 A Right. So there I was just saying one looks at their 19 literature and what they say in writing or orally about 20 their views and so on.</p> <p>21 Q Are you aware of any persons who identify themselves as 22 proponents of intelligent design who call themselves 23 intelligent design creationists?</p> <p>24 A Not in that three-word phrase, no.</p> <p>25 Q If not in that three-word phrase, do they describe</p>
<p style="text-align: right;">Page 67</p> <p>1 tree of life, which holds that there are ancestor 2 descended relationships among life forms. And then 3 there are hypotheses related to the mechanisms of 4 descent, which include Darwin's mechanism of random 5 mutation that's heritable and that is subjected to 6 natural selection. But there are other mechanisms, as 7 well, Darwin is not the last word on that. Genetic 8 drift, the specifics of the process, genetics that 9 relate to how that mechanism is instantiated in 10 particular biological organisms, so all of those causal 11 mechanisms. Hypotheses related to the kinds of traits 12 we see in organisms happen, adaptations and so on.</p> <p>13 And then sort of another class of questions having 14 to do with pathways, what's related to what, which 15 came first, which is an ancestor and what is 16 actually — hypotheses about the structure of the tree. 17 And there too, you have many, many, many specific 18 hypotheses about that. So that's just sort of a general 19 way of classifying what really has a lot of components.</p> <p>20 Q And I see in your report that you used a term 21 "intelligent design creationism" and you've used it here 22 today.</p> <p>23 Did you originate that term?</p> <p>24 A I don't know. I may have. I really don't know, it's 25 been some 15 years. And there may have been others</p>	<p style="text-align: right;">Page 69</p> <p>1 themselves in your opinion as intelligent design 2 creationists in other ways?</p> <p>3 A In writings they have described themselves as design 4 theorists, as advocates of intelligent design, as 5 advocates of the creation hypothesis, as advocates of 6 the God hypothesis, as advocates of theistic science, 7 and as advocates of creationism even at times. So all 8 of those terms have been used in various ways.</p> <p>9 Q Well, let me ask you this. In your report on page 5, 10 you have sort of four presuppositions of intelligent 11 design.</p> <p>12 Is it your opinion that these are the fundamental 13 characteristics of intelligent design theory?</p> <p>14 A So what I have on page 5 are what I call four key 15 elements. So I'm not claiming that this exhausts the 16 view, I'm just giving some core elements of it.</p> <p>17 Q And that's what I was getting at, I guess.</p> <p>18 Are these sort of the common tenets of intelligent 19 design theory as you understand them?</p> <p>20 A These are core views that are held and expressed in a 21 variety of ways. So when I say this is fundamental, 22 these are fundamental claims, what I mean to say is this 23 is at the center of their position.</p> <p>24 Q Well, let me ask it a different way.</p> <p>25 Is adherence to each of these four key elements a</p>

18 (Pages 66 to 69)

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 74</p> <p>1 creationism?</p> <p>2 MR. SCHMIDT: Off the record.</p> <p>3 (Discussion held off the record.)</p> <p>4 A Intelligent design is a kind of creationism. And the</p> <p>5 central features of creationism are general, they refer</p> <p>6 to a rejection of the scientific account of evolution in</p> <p>7 favor of some non-natural intervention or some</p> <p>8 unspecified non-natural creation design by a being or</p> <p>9 power. And intelligent design holds those views.</p> <p>10 BY MR. GILLEN:</p> <p>11 Q In your opinion, does the being or power that intervenes</p> <p>12 in creationism have any specific -- is said to have any</p> <p>13 specific attributes?</p> <p>14 A You're talking about the general notion of creationism?</p> <p>15 Q Yes, as you understand it.</p> <p>16 A The general notion of creationism allows there to be</p> <p>17 different specific views about the nature of that</p> <p>18 supernatural being or power. So one can have</p> <p>19 creationist views that are Christian, but one could also</p> <p>20 have creationist views that would be based in a</p> <p>21 different religion. Within Christianity -- let me say</p> <p>22 within Christian creationism, because certainly</p> <p>23 Christianity as a whole is not creationist, within</p> <p>24 Christian creationism, there are also a whole range of</p> <p>25 different positions that one could hold, so the</p>	<p style="text-align: right;">Page 76</p> <p>1 said in that definition, namely, a rejection of</p> <p>2 evolution in favor of a supernatural account, something</p> <p>3 that brings in something that's outside, outside of</p> <p>4 nature.</p> <p>5 Q Again I'm trying to understand the relationship of some</p> <p>6 of these concepts.</p> <p>7 Is theistic evolution creationism?</p> <p>8 A Theistic evolution is not an example of creationism.</p> <p>9 Q And why is that?</p> <p>10 A Theistic evolution as I use the term accepts the</p> <p>11 scientific account of evolution and says that that's</p> <p>12 compatible with a belief in God. Just to be clear,</p> <p>13 there are other people who have used the term "theistic</p> <p>14 evolution" in different ways, so there's a little bit of</p> <p>15 confusion in the literature on that. But this is not my</p> <p>16 term, either, it's a fairly standard sense of the term.</p> <p>17 Q And then you've indicated that you see intelligent</p> <p>18 design as a kind of creationism, is that correct?</p> <p>19 A Yes.</p> <p>20 Q Just explain precisely why you see intelligent design</p> <p>21 theory as a kind of creationism?</p> <p>22 A I thought that I had answered that in saying what</p> <p>23 features of ID make it creationist, and what I said</p> <p>24 there was that they're creationist in just this basic</p> <p>25 sense, in rejecting the scientific account and saying</p>
<p style="text-align: right;">Page 75</p> <p>1 specifics of that, like how the supernatural design</p> <p>2 creation was done, those can also differ. And so to be</p> <p>3 precise, one always has to say what kind of creationism</p> <p>4 it is, because the generic notion covers this whole</p> <p>5 range.</p> <p>6 So typically in the literature, and this certainly</p> <p>7 predates me, I didn't coin any of these terms, one would</p> <p>8 commonly speak about young earth creationism or old</p> <p>9 earth creationism where one holds in the one case a view</p> <p>10 that the earth is of recent origin, six to 10,000 years,</p> <p>11 and old earth creationists on the other hand could say,</p> <p>12 no, four and a half billion years. Both of those are</p> <p>13 creationist views because both of them in terms of the</p> <p>14 rest of their commitments still reject evolution, still</p> <p>15 think that it was some non-natural being or power that</p> <p>16 did the work.</p> <p>17 Q And I think the last part of your answer, Dr. Pennock,</p> <p>18 gets into something I'm just trying to get your opinion</p> <p>19 on, which is, is there any minimal content that's</p> <p>20 necessary in claiming attributes of the being or power</p> <p>21 responsible for creation in order for a given view to</p> <p>22 qualify as creationist?</p> <p>23 A Is there any minimal -- what was the term?</p> <p>24 Q Content.</p> <p>25 A Content. So the minimal content has to do with what I</p>	<p style="text-align: right;">Page 77</p> <p>1 you have to have a non-natural transcendent, a</p> <p>2 supernatural account.</p> <p>3 Q Is there any distinction between creationism and</p> <p>4 intelligent design theory as you see it?</p> <p>5 A The distinction is simply the generality of the term</p> <p>6 "intelligent design" is a kind of creationism. So there</p> <p>7 are forms of creationism that aren't intelligent design.</p> <p>8 Q Is there a distinction between theistic evolution and</p> <p>9 intelligent design theory?</p> <p>10 A Yes.</p> <p>11 Q What is that?</p> <p>12 A Intelligent design is a form of creationism and theistic</p> <p>13 evolution isn't. Theistic evolution accepts the</p> <p>14 scientific account of evolution but still holds that</p> <p>15 this is compatible with a belief in God. Intelligent</p> <p>16 design theorists explicitly reject that.</p> <p>17 Q You've used two other words I just want to ask you about</p> <p>18 a little, "natural" and "supernatural."</p> <p>19 When you describe something as natural, what do you</p> <p>20 mean?</p> <p>21 A I'm using the term "natural" in the sense in which it's</p> <p>22 used in science, which is to say referring to the</p> <p>23 empirical world, the physical world, its properties, its</p> <p>24 causal processes, essentially.</p> <p>25 Q And when you use the term "supernatural," what are you</p>

20 (Pages 74 to 77)

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 78</p> <p>1 getting at?</p> <p>2 A Supernatural as I'm using it refers to things that are</p> <p>3 not a part of that, that are beyond the causal structure</p> <p>4 of nature. The term itself sort of implies above, super</p> <p>5 nature, above, sometimes people use the metaphor of</p> <p>6 outside of nature. But obviously, this is not meant in</p> <p>7 a physical inside/outside sense because all of that</p> <p>8 would still be within the physical notion. So those are</p> <p>9 used somehow metaphorically, so it's not as though it's</p> <p>10 simply outside of time and space, it's a notion of some</p> <p>11 outside, above, beyond that causal structure, that</p> <p>12 physical structure of nature.</p> <p>13 Q Well, for me looking at some of the materials we've</p> <p>14 encountered in this case, it seems as if the categories</p> <p>15 are pliable at the boundaries. In light of your</p> <p>16 training in philosophy and history of science, is that</p> <p>17 true?</p> <p>18 A Can you tell me what you mean by ply -- first what the</p> <p>19 categories are and what do you mean by pliable at the</p> <p>20 boundaries?</p> <p>21 Q Well, it almost seems to me as if the two categories,</p> <p>22 natural and supernatural, are in some way bound in a</p> <p>23 specific time. And I guess to be more specific, it</p> <p>24 seems that some things that once were regarded as</p> <p>25 supernatural are now regarded as natural.</p>	<p style="text-align: right;">Page 80</p> <p>1 we've learned something. And that's not something that</p> <p>2 I would say is pliable, because that's the same notion</p> <p>3 that I was using before to say here's what counts as</p> <p>4 natural. That still is in place, it's just that before</p> <p>5 we thought that something was not natural and now we</p> <p>6 realize, we've learned, that that wasn't right.</p> <p>7 Q And I think I understand.</p> <p>8 The categories have stayed the same, what has</p> <p>9 changed is which category we put it in?</p> <p>10 A Right.</p> <p>11 Q And again, just trying to get a handle on the way in</p> <p>12 which these terms are used, if you look at page 14 of</p> <p>13 your report, there is a reference there in that last</p> <p>14 paragraph to a claim which you attribute to ID theorists</p> <p>15 that intelligence cannot be even a supervenient or an</p> <p>16 emergent property of matter.</p> <p>17 A Yes.</p> <p>18 Q And I thank you very much for footnote 6, which makes</p> <p>19 that somewhat more understandable to me, but as I</p> <p>20 understand that term -- or how do you use that, is that</p> <p>21 an example of a natural explanation for intelligence as</p> <p>22 connected with matter?</p> <p>23 A Is that an explanation -- when you say "that," just what</p> <p>24 are you referring to?</p> <p>25 Q Well, it's a terrible question. Let me put it this way.</p>
<p style="text-align: right;">Page 79</p> <p>1 Is that true?</p> <p>2 A There was a period in which certain things would have</p> <p>3 been judged occult, for example, that then became</p> <p>4 absorbed into science after science discovers that these</p> <p>5 things really do form a part of that physical, lawful</p> <p>6 structure of the world.</p> <p>7 Q Give me an example of --</p> <p>8 A And --</p> <p>9 Q Go ahead, I'm sorry.</p> <p>10 A I was about to give you an example.</p> <p>11 Q Thank you.</p> <p>12 A So the classic example of this is what's called action</p> <p>13 at a distance. That notion that there could be a causal</p> <p>14 influence from things at a distance was thought at one</p> <p>15 time to be occult, but some of the things that were</p> <p>16 pointed to as being occult were figured out as things</p> <p>17 that one could understand in a lawful way. Action at a</p> <p>18 distance is something that one can show, as Newton did,</p> <p>19 I mean, Newton's example of gravity is the key example</p> <p>20 I'm thinking of, to be testable, measurable, lawful, and</p> <p>21 so that then changes the way we think about it.</p> <p>22 Previously we thought of it as occult, and now we</p> <p>23 realize, oh, that really wasn't occult, that actually is</p> <p>24 part of the world, so it actually becomes now part of</p> <p>25 the causal structure of the world. In part because</p>	<p style="text-align: right;">Page 81</p> <p>1 In terms of the categorization we just discussed</p> <p>2 between natural and supernatural, would this claim that</p> <p>3 intelligence could be an emergent property of matter, is</p> <p>4 that a natural claim?</p> <p>5 A To hold the view that intelligence is a supervenient or</p> <p>6 emergent property of matter would be something that</p> <p>7 places it within what I've defined as nature.</p> <p>8 That's -- those are all categories that fall within that</p> <p>9 notion.</p> <p>10 Q And why is that?</p> <p>11 A Why is it that those fall under --</p> <p>12 Q Yes.</p> <p>13 A -- the notion of natural?</p> <p>14 Q Yes.</p> <p>15 A Because they have those properties, they arise out</p> <p>16 of -- at perhaps a higher level of organization, they</p> <p>17 arise out of those same causal principles, those same</p> <p>18 elements as the other things that we're considering as</p> <p>19 nature, they don't fall outside of nature.</p> <p>20 Q And when you say "nature" there, Dr. Pennock, are you</p> <p>21 referring to the physical material reality of the</p> <p>22 matter?</p> <p>23 A The terms "materialism" and so on are sometimes used.</p> <p>24 And so when you're asking whether this is just related</p> <p>25 to matter, if what you're asking is, is it just basic</p>

21 (Pages 78 to 81)

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 82</p> <p>1 materialism in that sense, that's not quite right. I</p> <p>2 think the broader term "physicalism," that is to say the</p> <p>3 physical world, the natural world, includes matter, but</p> <p>4 it also includes the properties of matter, matter in</p> <p>5 motion, forces, all of these causal processes. So it's</p> <p>6 a little oversimplified to simply say "matter," but if</p> <p>7 you understand that broadly in the sense of all the</p> <p>8 physical stuff and forces of the world, the causal</p> <p>9 processes of the world, that's what I'm referring to.</p> <p>10 Q Again, I'm just trying to understand your perspective on</p> <p>11 this.</p> <p>12 How does science deal with the supernatural, how</p> <p>13 does it determine something is supernatural?</p> <p>14 MR. SCHMIDT: Which question do you want him to</p> <p>15 answer?</p> <p>16 MR. GILLEN: The second one.</p> <p>17 A How does science deal with the supernatural?</p> <p>18 BY MR. GILLEN:</p> <p>19 Q How does science determine something is supernatural?</p> <p>20 A Science doesn't have a way of determining features of</p> <p>21 the supernatural. Science doesn't have access to</p> <p>22 anything about the supernatural.</p> <p>23 Q Is science capable of defining something as</p> <p>24 supernatural?</p> <p>25 A Science defines things as supernatural just in the sense</p>	<p style="text-align: right;">Page 84</p> <p>1 which is not within this causal structure of the world,</p> <p>2 it turns out that it was.</p> <p>3 Q Is it true that the ability of science to make that</p> <p>4 recategorization from supernatural to natural depends</p> <p>5 upon the ability of the scientists to explain, to offer</p> <p>6 an hypothesis about the phenomena or a given phenomena?</p> <p>7 A Changing one's view, scientific understanding of this,</p> <p>8 is a function of coming to know, coming to discover that</p> <p>9 something that before you relegated to the mysterious</p> <p>10 occult now actually is seen to be a lawful causal</p> <p>11 process that can be studied in the ordinary way. It is</p> <p>12 a discovery.</p> <p>13 Q And it seems from the example we've been working with,</p> <p>14 which is that of gravity, that the discovery hinges on</p> <p>15 the ability of the theory to predict what you call the</p> <p>16 lawful causal relationship, is that correct?</p> <p>17 A Not quite. It doesn't hinge upon -- just upon the</p> <p>18 theory's ability to predict something. One confirms</p> <p>19 something in science through a whole process of</p> <p>20 gathering evidence and so on, so that relates back to</p> <p>21 what we were talking about before with confirmation</p> <p>22 theory. And that's connected to explanation.</p> <p>23 So in finding that gravity is a natural causal</p> <p>24 process like other ones, essentially what one is doing</p> <p>25 is finding the causal processes, the regularities, that</p>
<p style="text-align: right;">Page 83</p> <p>1 that I was saying, if it is not part of the causal</p> <p>2 structure of the world, not part of that world we call</p> <p>3 nature, so the lawful causal processes and so on of the</p> <p>4 physical world, if it is not that, then it's</p> <p>5 supernatural.</p> <p>6 Now again, this is something where one has to ask</p> <p>7 who's putting something forward, because in the example</p> <p>8 that we gave before -- or what I mean is how something</p> <p>9 is being put forward. So something that we might have</p> <p>10 regarded as supernatural, we could find out that it</p> <p>11 isn't by finding out that in fact it is understandable</p> <p>12 and discoverable in the ordinary scientific way, like</p> <p>13 gravity, not a spooky supernatural, but just an ordinary</p> <p>14 natural discovery.</p> <p>15 Q So I think what you're saying is that science can come</p> <p>16 to see something once thought supernatural or occult is</p> <p>17 not supernatural, is that correct?</p> <p>18 A That was the example that I gave of action at a</p> <p>19 distance, that was something that was -- what previously</p> <p>20 had been thought of as occult, and once it's discovered</p> <p>21 to be something that is a lawful regularity, testable,</p> <p>22 determinable, usable in all of the ordinary scientific</p> <p>23 forms of investigation that let us learn about it, then</p> <p>24 we no longer think of it as occult, we no longer think</p> <p>25 of it as supernatural, because supernatural is that</p>	<p style="text-align: right;">Page 85</p> <p>1 will then let one explain things that one sees. So is</p> <p>2 that -- I'm not sure if that answers your question, but</p> <p>3 that's how those issues are connected. We can test</p> <p>4 gravitational laws, we can use them.</p> <p>5 Q Let me ask you a question maybe in a different way.</p> <p>6 In your report on page 18 in note 8, there's a</p> <p>7 reference to a SETI project. What is that project?</p> <p>8 A I'm sorry, note 18 of --</p> <p>9 Q Note 8. Page 18, note 8.</p> <p>10 A Here I'm referring to Dembski's argument.</p> <p>11 Q Okay.</p> <p>12 A And he makes reference to Mount Rushmore and the SETI</p> <p>13 project.</p> <p>14 Q What is your understanding of the SETI project?</p> <p>15 A The SETI project is the search for extraterrestrial</p> <p>16 intelligence, it's a project that aims to see if we can</p> <p>17 find beings on other worlds.</p> <p>18 Q And in terms of this dichotomy we have here between</p> <p>19 natural and supernatural, where does this fall in your</p> <p>20 opinion?</p> <p>21 A Fully within the natural views as a scientific</p> <p>22 investigation.</p> <p>23 Q And why do you say that?</p> <p>24 A From my understanding of the SETI project and how it</p> <p>25 works, how the investigation is carried out, it is done</p>

22 (Pages 82 to 85)



ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 86</p> <p>1 with standard scientific methods and science and 2 standard scientific assumptions. 3 Q And what are the scientific standards and scientific 4 methods? 5 A In the SETI case in particular, as I understand the way 6 the project works, through use primarily of radio 7 telescopes, the investigators scan star systems looking 8 for a radio signal, and what they then do is analyze the 9 signal that they get with the hope of finding a 10 broadcast, particularly a kind of signal that would be 11 indicative of other beings. 12 Q And what scientific method would be used to make that 13 evaluation? 14 A What would be the method to tell whether you have a hit? 15 Q Yes. 16 A So I'm not an astronomer, but I did at one point 17 interview a member of the SETI project with regard to 18 that, and my understanding was that they were looking 19 for a type of modulation in the signal, a very simple 20 kind of signal that indicates an artificial source. And 21 I don't know enough about the details to be able to say 22 what it was. I had specifically asked this to find out 23 whether there was a sense in which they were using 24 something like Dembski's method, since he claims that 25 the SETI project uses his method, and the person that I</p>	<p style="text-align: right;">Page 88</p> <p>1 something that provides the basis for that belief on 2 your part? 3 A With regard to Behe in particular? 4 Q Yeah. 5 A In that case, I would have to look at my notes, but the 6 way in which he describes the conclusion of his 7 irreducible complexity argument, I think that would be 8 the place where in his description of it's not possible 9 for something natural to produce this, I think there you 10 would sort of see implied that this is some sort of 11 non-natural thing, that there aren't causal processes, 12 natural causal processes that can produce this. 13 Q Again looking at page 14 of your report, there's a 14 statement that -- let me see if I can -- I'm trying to 15 understand this. According to ID theory, not even 16 extraterrestrial or human intelligences are actually 17 natural, but rather, are supernatural, immaterial 18 intelligences that are somehow embodied. 19 Do you understand Michael Behe to make that claim? 20 A Behe has said and indeed insisted that the kinds of 21 systems that he identifies as irreducibly complex 22 systems cannot be produced by any natural process, 23 physical, chemical processes. And to the extent that 24 he's consistent, he would thereby hold this position. 25 Not saying that he's always consistent on this point, I</p>
<p style="text-align: right;">Page 87</p> <p>1 talked to said that that was not even close to the case. 2 Q Who did you interview? 3 A His name was Seth Shostack. I think it's S-h-o-s-t-a-c-k. 4 I'm actually not sure of the spelling of the last name. 5 Q Did he explain why their methodology or how their 6 methodology diverged from Dembski's theory? 7 A He has a paper that he's written, so -- and that's 8 accessible. 9 Q On page 14, again in note 5, there's a definition of 10 supernatural. And I just want to ask you do you know of 11 persons who are intelligent design proponents who use 12 this definition? 13 A This or something very close to this is fairly standard 14 among intelligent design creationists. Phillip Johnson, 15 for one, has a definition that's very close even in 16 wording to this. 17 Q Do you know if Dembski uses the term "supernatural" in 18 this way? 19 A Yes, I believe he does. 20 Q How about Michael Behe? 21 A I believe that -- I'm not seeing something where he 22 gives a definition, but I think from other things that 23 he has said, this would be in line with what he must 24 view. 25 Q And when you say that, Dr. Pennock, can you point me to</p>	<p style="text-align: right;">Page 89</p> <p>1 don't think that he is. 2 Q Okay. How about Scott Minnich, do you know whether he 3 holds to that position? 4 A In my conversations with Minnich, he has seemed to 5 support Behe's view and argued in favor of just that 6 view that I mentioned. So again, to the degree that he 7 holds that, I would say that would be so, too, but I 8 have not read anything specifically that he's written on 9 that, so this is just an inference from our conversation 10 and his support of Behe's IC argument. 11 Q How about Dembski, do you understand him to hold that 12 position? 13 A Dembski, definitely so, yeah. 14 Q Do you believe that intelligent design creationists as 15 you call them, theorists as they call themselves, make a 16 claim that science proves the attributes of the 17 designer? 18 A Do I say that they say? 19 Q Yes. 20 A They are inconsistent in what they say on this. In some 21 places they say ID says nothing about the attributes of 22 the designer. In other cases, they say very specific 23 things. So they are inconsistent in what they say on 24 that point. 25 Q Looking at Dembski, can you point me to a source in</p>

23 (Pages 86 to 89)



ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 90</p> <p>1 which he claims that science, intelligent design theory, 2 can demonstrate the attributes of the intelligent cause 3 he posits?</p> <p>4 A Here too I would have to look back to notes and research 5 to give you a specific reference, but in my report I do 6 quote Dembski at one point in which he says that 7 intelligent design is the Logos of John's Gospel 8 restated in the idiom of information theory, and that 9 notion of the Divine Logos has content with regard to 10 the attributes of the designer. So in that sense, I 11 think that's an example of that from him. So I do have 12 that in my report, though.</p> <p>13 Q Okay. How about Michael Behe, can you point me to a 14 source where he claims that science, intelligent design 15 theory, proves the attributes of the intelligent cause?</p> <p>16 A Here too I would have to look in notes to give you 17 detailed specific references, but I do know of one case 18 just off the top of my head where he is writing about 19 another intelligent design advocate, Nancy Pearcey, who 20 is giving in her book, I'm pretty sure this is her book, 21 Total Truth, where she is explaining intelligent design 22 and explaining its importance, and Behe in his 23 recommendation for this book talks about how this is 24 describing how the new science of intelligent design is 25 giving a backing to the Christian view of truth. So I</p>	<p style="text-align: right;">Page 92</p> <p>1 Q Let me ask you, in terms of the term that we've talked 2 about this morning "religion," how do you look at the 3 distinction between religion and science?</p> <p>4 A Could you be a little more specific?</p> <p>5 Q Do you see them as two different things?</p> <p>6 A Yes, I see science and religion as being different.</p> <p>7 Q How do you differentiate the two?</p> <p>8 A Religion and science differ with regard to their 9 methods, their way of viewing the world, often their 10 specific claims, they're different kinds of enterprises.</p> <p>11 Q How do you in your work differentiate religion from 12 science, how do you distinguish a religious claim from a 13 scientific claim?</p> <p>14 A Scientific claims are distinguished by what I've talked 15 about before, the methods of science, a mode of 16 investigation where certain -- a certain framework is 17 presumed for how one goes about validating, justifying a 18 claim having to do with the causal processes of the 19 world. You do investigations, you do experiments that 20 help you determine what the causal processes are. You 21 can then use those to make your way around in the world 22 to draw inferences about other things. That whole range 23 of methods within that framework, what I've been 24 discussing before, that's what I would call science. 25 Religion is probably a broader, harder to define</p>
<p style="text-align: right;">Page 91</p> <p>1 don't -- I'm paraphrasing now, so I can't give you the 2 exact wording, but essentially, it's something that's 3 endorsing a view that's identifying this with a 4 Christian notion.</p> <p>5 Q In your view, does pointing to the consistency between 6 the findings of a scientific theory and religious 7 beliefs constitute a claim that science shows the 8 religious belief is true?</p> <p>9 A I think this was a question you had given us -- 10 MR. SCHMIDT: This morning.</p> <p>11 A -- that we talked about earlier. So mere consistency, I 12 think the way you asked it before, does showing mere 13 consistency, is that equivalent to saying it's religion, 14 so merely doing that, I would say, does not constitute 15 religion, per se. But in this particular case, the 16 argument that's being made is that this is showing the 17 objective reality of, it is, in Pearcey's words, showing 18 that, quote, the Christian view is total truth.</p> <p>19 Now, that's a particular notion, and actually, this 20 does maybe answer the question you asked me about 21 attributes, because in fact it is a particular Christian 22 notion and by no means the general interpretation of all 23 Christian theologians. So it is saying my 24 understanding, my picture of Christianity, is supported 25 by this.</p>	<p style="text-align: right;">Page 93</p> <p>1 notion simply because we allow things to be classified 2 as religion even when they have quite different basic 3 commitments. But there are certain things that we 4 standardly take to be religion.</p> <p>5 And in reviewing standard definitions of religion 6 in preparation for this before I was writing my report, 7 a pretty standard element of that is belief in, appeal 8 to, supernatural beings and powers, sometimes explicitly 9 with regard to the creation and governance of the world. 10 But that element comes up fairly consistently. That's 11 not to say that every religion would have to do that, 12 because again, we classify some things as religion even 13 though they may not have that kind of commitment, but 14 that seems to be a pretty standard characteristic such 15 that if it has that, that's enough to make it religion.</p> <p>16 Q In terms of your definition of science, is it your 17 opinion that methodological naturalism is the hallmark 18 of science?</p> <p>19 A Methodological naturalism is a basic element of 20 scientific reasoning.</p> <p>21 Q Is it the defining characteristic of science?</p> <p>22 A As we've discussed before, I think science is 23 characterized by its methods. And science is 24 complicated, there are lots of things that it does. 25 Methodological naturalism is a term that highlights one</p>

24 (Pages 90 to 93)

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 94</p> <p>1 key feature of that method. So in that sense, yes.</p> <p>2 Q Are there other key features of science?</p> <p>3 A Again, science has a whole range of characteristic</p> <p>4 elements. That's the one that I identify here as being</p> <p>5 most relevant to the case at hand.</p> <p>6 Q And why is that?</p> <p>7 A I emphasize methodological naturalism because it is such</p> <p>8 a central feature of science and because it is so</p> <p>9 explicitly rejected by intelligent design creationists.</p> <p>10 That by itself is easily documented, it functions as an</p> <p>11 essential element of their position. They say</p> <p>12 themselves that the key goal they have is to change the</p> <p>13 ground rules of science. Methodological naturalism is</p> <p>14 what they identify as one of those ground rules. They</p> <p>15 explicitly say this is what needs to be eliminated so</p> <p>16 that we can once again have a theistic science. So that</p> <p>17 makes it very easy to identify why it is that</p> <p>18 creationism doesn't count. And it's easy to document in</p> <p>19 their literature.</p> <p>20 Q Apart from that, are there any other key features of</p> <p>21 modern science that are rejected by intelligent design</p> <p>22 theorists?</p> <p>23 A What other things about science are rejected would</p> <p>24 require really going through a lot of detail with regard</p> <p>25 to specific folks and specific claims. So for example,</p>	<p style="text-align: right;">Page 96</p> <p>1 methods of science.</p> <p>2 Q Do you understand all intelligent design theorists to</p> <p>3 reject methodological naturalism?</p> <p>4 A So far as I have read, that's been a consistent theme</p> <p>5 and in their terms a defining theme. By saying the</p> <p>6 defining concept of our movement is theistic realism,</p> <p>7 they are planting a flag in their writings about what's</p> <p>8 at stake, what's at issue, this is what comes up.</p> <p>9 methodological naturalism needs to go. In their</p> <p>10 internal documents, the naturalist assumption,</p> <p>11 materialism, that's what we aim to overturn. Again and</p> <p>12 again, although sometimes put in different terms, but</p> <p>13 sometimes quite explicitly, that's their key target.</p> <p>14 And I don't know of anyone in the movement that wouldn't</p> <p>15 hold to that, that seems to be pervasive.</p> <p>16 Q On page 10 of your report, Dr. Pennock, the last</p> <p>17 paragraph beginning at the foot of the page there,</p> <p>18 you're talking about a defining element of IDC is in</p> <p>19 your opinion its essential reliance upon supernatural</p> <p>20 beings and powers, and then in the last full sentence on</p> <p>21 the page you say scientific explanations need not cite a</p> <p>22 specific law of nature, but they are always understood</p> <p>23 to be restricted to the physical realm of law-bound</p> <p>24 cause and effect relations.</p> <p>25 Is it your understanding that all intelligent</p>
<p style="text-align: right;">Page 95</p> <p>1 particular conclusions that science has come to that are</p> <p>2 now part of our understanding of the world are things</p> <p>3 that particular creationists would reject and other</p> <p>4 things, others might -- so there's just -- there's a</p> <p>5 whole range of things --</p> <p>6 Q My question was imprecise. I'm looking in terms of</p> <p>7 method and just trying to get a sense for do you have an</p> <p>8 opinion concerning whether there are other key features</p> <p>9 of scientific method that are rejected by intelligent</p> <p>10 design theorists?</p> <p>11 A Again, I'd have to sort of say the same thing, that</p> <p>12 depending upon who one is talking to, their revolution</p> <p>13 that they're trying to institute would change more or</p> <p>14 less of what we now take to be basic science. So for</p> <p>15 example, there are suggestions that some intelligent</p> <p>16 design creationists have made that it might be proper,</p> <p>17 for example, that there could be matters of empirical</p> <p>18 fact that couldn't be determined by empirical methods,</p> <p>19 but that would properly be decided by sacred books or</p> <p>20 mystical states. Phillip Johnson mentions that, I think</p> <p>21 I have that in my report here. Now, that's not</p> <p>22 something where he explicitly says I endorse this as a</p> <p>23 method, but he opens the door to it and suggests maybe</p> <p>24 this is the way to go. So things of that sort one could</p> <p>25 find. And those are very clear rejections of the</p>	<p style="text-align: right;">Page 97</p> <p>1 design theorists reject that premise?</p> <p>2 A You read a whole sentence there. So which part are you</p> <p>3 thinking -- are you asking about, the part about citing</p> <p>4 a specific law of nature or about being restricted to</p> <p>5 the physical realm of law-bound cause and effect</p> <p>6 relationships?</p> <p>7 Q Let me see if I understand the sentence there. It seems</p> <p>8 that this sentence makes a claim for scientific</p> <p>9 explanations and it says they need not cite a specific</p> <p>10 law of nature, but they are always understood to be</p> <p>11 restricted to the physical realm of law-bound cause and</p> <p>12 effect relations, is that correct?</p> <p>13 A That's my explanation of -- explication of what</p> <p>14 scientific explanations are, yes.</p> <p>15 Q And do you have an opinion concerning whether</p> <p>16 intelligent design theorists reject that claim?</p> <p>17 A Yes, that's one of the claims that they reject.</p> <p>18 Q And do you believe that all intelligent design theorists</p> <p>19 reject that claim?</p> <p>20 A So far as I know, that's the case. That's what it means</p> <p>21 for them to say that they're rejecting methodological</p> <p>22 naturalism.</p> <p>23 Q On page 14 under heading 4.3, the last sentence -- no,</p> <p>24 it's not, it's the third to last sentence in that first</p> <p>25 paragraph.</p>

25 (Pages 94 to 97)

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

Page 98	Page 100
<p>1 MR. SCHMIDT: That's --</p> <p>2 A I'm sorry, page 14?</p> <p>3 BY MR. GILLEN:</p> <p>4 Q Yes, page 14, the sentence that begins "That is to say,</p> <p>5 design is defined by negation in ID theory as whatever</p> <p>6 is not constrained by natural law."</p> <p>7 A Yes, I see that.</p> <p>8 Q Again, I just want to get an understanding of your</p> <p>9 opinion.</p> <p>10 Is it your opinion that all intelligent design</p> <p>11 theorists define design in that way?</p> <p>12 A In that particular sentence, I'm quoting Bill Dembski in</p> <p>13 his writings that form what they say is the basis of</p> <p>14 their view. So to the degree that those in the</p> <p>15 intelligent design movement cite Dembski, then that's</p> <p>16 explicitly so. In other cases, they don't use that</p> <p>17 particular phrasing, but they'll use other phrasing</p> <p>18 that's essentially equivalent to that. So in its basic</p> <p>19 commitment, I would say that's what they mean.</p> <p>20 Now, I've also written that they use the term</p> <p>21 inconsistently, that the term "design" is regularly used</p> <p>22 in multiple ways in their writings, which is part of the</p> <p>23 problem with their whole approach, that it becomes</p> <p>24 ambiguous what they mean in particular cases, and it's</p> <p>25 by sliding from one notion of design to another that you</p>	<p>1 and then they'll gesture to Dembski. And so that's the</p> <p>2 reason I quoted this particular one, because that's the</p> <p>3 sense in which he uses it. But in fact, if the question</p> <p>4 is how do intelligent design theorists use the term</p> <p>5 "design," the real answer is inconsistently.</p> <p>6 Q Let me ask you this. On page 20 of your report there's</p> <p>7 a heading Testability and there's sort of a dichotomy</p> <p>8 you offer here between occult and natural.</p> <p>9 I want to ask you whether the testability that</p> <p>10 you've described here in this section of your opinion is</p> <p>11 an essential ingredient of science?</p> <p>12 A So I think this is something that we've talked about</p> <p>13 before in the sense that science has a set of methods,</p> <p>14 and that for something to be a scientific investigation,</p> <p>15 there are certain things that you see. And whether we</p> <p>16 call something natural or supernatural in part is a</p> <p>17 function of our access to that, is this within the</p> <p>18 causal structure of the world or not, part of the lawful</p> <p>19 regularities of the world. And the thing that happened</p> <p>20 in the case of occult properties, gravity, was that</p> <p>21 something that we thought was supernatural is seen to be</p> <p>22 natural. How did that happen? It happened because we</p> <p>23 realized we could test this, we could do an</p> <p>24 investigation, find how those unusual processes worked,</p> <p>25 you can do experiments to determine the gravitational</p>
Page 99	Page 101
<p>1 often get the fallacy in their argument. So it's not as</p> <p>2 though they always use this definition of design. In</p> <p>3 fact, they don't, they will sometimes use design in a</p> <p>4 colloquial sense. And even with multiple colloquial</p> <p>5 meanings.</p> <p>6 Design is a very protean term, I mean, it has lots</p> <p>7 of specific meanings. And in some cases they will use</p> <p>8 the term when they're pointing to, for example, a</p> <p>9 function, so they'll say there's a design. In other</p> <p>10 cases, they'll switch to the notion of design as</p> <p>11 intentioned, they did that by design. There are</p> <p>12 actually a whole range of meanings. Those are sort of</p> <p>13 two crucial ones that come up.</p> <p>14 So in any particular writing or talk that they</p> <p>15 give, one always has to pay close attention to the way</p> <p>16 in which the term "design" is being used because often</p> <p>17 they will jump from one term to another, which I think</p> <p>18 makes the argument very problematic to follow, you can</p> <p>19 see that they're using it in one sense in a premises and</p> <p>20 then they're trying to draw a conclusion, but that uses</p> <p>21 it in a different sense, so it really is a fallacy of</p> <p>22 ambiguity.</p> <p>23 I point to this definition sort of out of a sense</p> <p>24 of charity because they will often claim, oh, but it's</p> <p>25 our technical writings that you should pay attention to,</p>	<p>1 laws, and it's by virtue of that that we discovered that</p> <p>2 something that we thought was supernatural isn't.</p> <p>3 So that's the sense in which I'm using the term</p> <p>4 here, that if it were to have been the case, such as was</p> <p>5 found in gravity, that one could test and discover and</p> <p>6 bring this into the causal structure of the world or</p> <p>7 realize that it is in the causal structure of the world,</p> <p>8 then that would have been fine, would have made it part</p> <p>9 of nature, part of science.</p> <p>10 Q On page 21 you have a reference to -- the second full</p> <p>11 paragraph there begins with a reference to</p> <p>12 experimentation and confirmation. The second full</p> <p>13 paragraph. And again, I'm trying to get a sense for</p> <p>14 your opinion of the scientific method which you believe</p> <p>15 characteristic of science.</p> <p>16 Is this second full paragraph beginning</p> <p>17 "Experimentation requires observation and control of the</p> <p>18 variables" on through the end of that paragraph there,</p> <p>19 is that in your opinion an essential element of modern</p> <p>20 science?</p> <p>21 A What I'm referring to in that paragraph is explicitly</p> <p>22 what's called randomized controlled experiments, so it's</p> <p>23 a kind of design practice. And that's the gold standard</p> <p>24 for confirming causal hypotheses. So what I was getting</p> <p>25 at here was it's a little misleading to say "the"</p>

26 (Pages 98 to 101)



ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 102</p> <p>1 scientific method, as though there's just the one thing,  2 but there are scientific methods, so what I'm pointing  3 to here is the gold standard for confirming causal  4 relationships.</p> <p>5 Q And I think I understand you correctly. It seems that  6 the thrust of your answer is it's not the only standard  7 for confirming causal relationships, is that correct?</p> <p>8 A Now, this is the basic way in which a causal  9 relationship is confirmed. Sometimes one has to have a  10 weaker notion if it's not possible to randomize the  11 variables, for example. Sometimes it's not possible to  12 have a control for every variable. Sometimes instead of  13 a randomized controlled experiment, you have to have a  14 prospective or a retrospective study where you track  15 over time, but you're not able to actually intervene.  16 Now, each of those kinds of procedures is used in  17 science, but they're always thought of as being less  18 justificatory in terms of the strength of the evidence.</p> <p>19 So that's the sense in which I'm saying the  20 randomized controlled experiment is the gold standard  21 for this. That's what will let you say I've put in  22 place two systems, an experimental system, a controlled  23 system, that vary just with regard to the independent  24 variable, that is to say, the variable that I'm testing,  25 and it's by virtue of that setup, I'm assigning the test</p>	<p style="text-align: right;">Page 104</p> <p>1 there.</p> <p>2 A Just in a very straightforward manner, the elements that  3 one is -- has test -- the elements that are being tested  4 have to be tested in relationship to observable  5 properties. So if you're testing the efficacy of a  6 drug, you've got to be able to observe the effects.</p> <p>7 Q Maybe let me ask it another way.  8 Is observation in a sort of physical sense  9 essential to science or are there phenomena that cannot  10 be observed that nonetheless can be proven?</p> <p>11 A I think those are two different --</p> <p>12 Q Different questions?</p> <p>13 A Can you --</p> <p>14 Q Let's go with the second one.  15 Are there phenomena that cannot be observed but can  16 be proven to exist?</p> <p>17 A Yes, it happens all the time.</p> <p>18 Q And if we look at one of the elements of evolutionary  19 theory which we've discussed, common descent, is that  20 observed or inferred?</p> <p>21 A Like anything else, it's something where you confirm it  22 on the basis of data. So we can directly observe some  23 descent relationships, and others we infer.</p> <p>24 Q And is the same true of natural selection?</p> <p>25 A Yes, in exactly the same way.</p>
<p style="text-align: right;">Page 103</p> <p>1 subjects or the subject matter to one or another group  2 randomly, so I'm not getting any bias in there in  3 advance, it sets up a circumstance where you can then do  4 statistical analysis and then you could say a difference  5 that you see in the end is a function of that variable  6 and not the others, it was the cause. So that's the  7 sense in which you say now we know, cause and effect  8 relationship, this causes this in that situation. And  9 once you have that, then you can draw other sorts of  10 inferences, but that's the basic form.</p> <p>11 MR. SCHMIDT: Are you about to turn the page? Is  12 this a good time for --</p> <p>13 MR. GILLEN: That's fine with me if you want to  14 take a quick break, sure.</p> <p>15 (Short recess.)</p> <p>16 BY MR. GILLEN:.....</p> <p>17 Q Dr. Pennock, you mentioned another sort of hallmark of  18 modern science in your report, which is observability.  19 Do you regard observability as an essential  20 ingredient of modern science?</p> <p>21 A Can you give me the page where --</p> <p>22 Q Yeah. Well, it's -- I'm trying to understand again that  23 paragraph on page 21, experimentation requires  24 observation and control of the variables, and I'm just  25 trying to get the sense in which you used "observation"</p>	<p style="text-align: right;">Page 105</p> <p>1 Q Do you have an opinion concerning whether the mere  2 openness of a theory to the possibility of supernatural  3 causality makes that theory unscientific?</p> <p>4 A I'm not sure of the force of the term "openness" to the  5 possibility. This seems to again connect directly to  6 methodological naturalism. As a method, as a point of  7 method, the constraint upon science is that you may only  8 appeal to natural things, you may not appeal to a  9 possibility of supernatural causes and powers. So in  10 that sense, I'm not sure if that's what you meant by  11 openness, methodological naturalism isn't open to that.</p> <p>12 In a different sense, it's open to the possibility  13 just in the ordinary way that there are things that are  14 conceptual possibilities, metaphysical possibilities,  15 that science is neutral about. So when you say, well,  16 I'm open to that possibility but it's just not part of  17 science, I leave that to religion, philosophy, whatever.</p> <p>18 So there's sort of different notions of openness  19 there, and on the one hand I'd say no, it's not open to  20 it, and on the other hand, I'd say sure, it is. I'm  21 just neutral with regard to it.</p> <p>22 Q Maybe I can ask it in a different way.  23 In your view, does a failure to rule out  24 supernatural causes by definition make an inquiry not  25 scientific?</p>

27 (Pages 102 to 105)

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 106</p> <p>1 A So I think my answer to this is the same as the previous 2 one, so if there was a difference in your meaning of the 3 question, let me know. But again, I would say here 4 that, again, if the sense is, is one staying within the 5 framework of methodological naturalism or not, that's 6 what's at issue, right? And it's not as though one 7 rules out the conceptual possibility, again, one is open 8 to metaphysical things and is saying that's not part of 9 science, but on other hand, one says here we are within 10 science, and no, we don't allow appeal to that.</p> <p>11 Q So —</p> <p>12 A Unless it turns out to be occult properties like gravity 13 which turn out to be not supernatural.</p> <p>14 Q Can science disprove the existence of supernatural 15 phenomena?</p> <p>16 A So again, this turns upon what one means by the term. 17 One might say, oh, well, we've disproven that occult 18 properties are supernatural, we've now confirmed them as 19 natural. That's sort of an odd way of putting it. So I 20 don't know that I would think of it in those terms. And 21 maybe that's not the way that you meant it.</p> <p>22 If we think of it in the other sense, where it's 23 not an example like that, then I would say that 24 metaphysical possibilities, and that's what I understand 25 the supernatural world to be, those things that are</p>	<p style="text-align: right;">Page 108</p> <p>1 Q Let me ask you, I think I know the answer, but in your 2 opinion, is the concept of irreducible complexity a 3 scientific theory, or a scientific hypothesis, I guess I 4 should say?</p> <p>5 A Irreducible complexity itself is just a purported trait. 6 So by itself, it's not a hypothesis.</p> <p>7 Q Is it a theory?</p> <p>8 A No, it's just a — I mean by itself, it's just a 9 purported property.</p> <p>10 Q Well, is irreducible complexity as presented by Behe in 11 his writings a scientific theory?</p> <p>12 A There's more to Behe's view than just the concept of 13 irreducible complexity. Behe puts that concept into a 14 claim, so he's saying things. So perhaps that's the 15 question that you're asking then, is are Behe's claims 16 about irreducible complexity scientific or not? Is that 17 fair?</p> <p>18 Q That's fair, thank you.</p> <p>19 A So here one has to look at what he says about 20 irreducible complexity, and the first thing that he says 21 is that there is no way for such a system to be produced 22 by the Darwinian mechanism or any natural mechanism, so 23 that then is a claim actually about evolution. And the 24 other thing that he then says is such systems require 25 design, by which he means non-natural, some non-natural</p>
<p style="text-align: right;">Page 107</p> <p>1 outside the causal structure of the world, and in that 2 sense, I'd say we don't disprove them, we're neutral 3 with regard to that.</p> <p>4 Q Does the willingness to entertain the possibility of 5 supernatural causation in your opinion make something a 6 metaphysical theory, not a scientific theory?</p> <p>7 A So again, perhaps I'm misunderstanding the question, but 8 I take this to be the same question as before, being 9 open to the possibility, and in that sense, my answer 10 really is the same, as well, that one can be willing to 11 entertain the possibility metaphysically as a 12 philosopher or as a person or as a believer and so on, 13 but that's different from what one does within science 14 within the constraints of the method.</p> <p>15 Q Okay. And I do think I understand you. One last thing. 16 Does that willingness to entertain supernatural..... 17 causation as a possibility in your opinion make a theory 18 a religious theory?</p> <p>19 A So as I said before when we were talking about religion, 20 the basic definitional appeal that I'm making there is 21 to the general one that one finds in characterizations 22 of religion, belief in supernatural powers or beings who 23 were involved in a creation and governance of the world. 24 And in that sense, I'd say yes, by positing that sort of 25 thing, you are entering the realm of religion there.</p>	<p style="text-align: right;">Page 109</p> <p>1 power or being. So those are two different things.</p> <p>2 The first one is simply a challenge to evolution, 3 here's something purportedly that science can't explain, 4 something purportedly that evolution can't do. And as 5 we discussed before, if one thinks about it in the 6 ordinary scientific sense, that is to say under the 7 assumptions of methodological naturalism, you'd say, 8 well, let's test it and find out. And in our system, 9 just as one example, you can observe evolution producing 10 irreducibly complex things, and so in that sense we'd 11 say that challenge fails. If one departs from 12 methodological naturalism and asks the same question, 13 then who knows what the answer is in that case.</p> <p>14 Q Do I understand that observation you made with respect 15 to his second claim related to design as being 16 unscientific?</p> <p>17 A Behe's second claim as I put it there had to do with 18 saying my alternative hypothesis, as he puts it, my 19 alternative theory, as he puts it, is some transcendent 20 designer, some non-natural design. That's the part in 21 which I'd say now you've departed from science, you've 22 stepped outside what science can do.</p> <p>23 Q Do you understand the design inference as offered by 24 Behe as necessarily entailing recourse to the 25 supernatural?</p>

28 (Pages 106 to 109)



ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 110</p> <p>1 A As Behe puts the proposition, it seems to me clear and 2 essential that it is in his terms non-natural, that's 3 his basic claim.</p> <p>4 Q And why do you say that, Dr. Pennock, what is the basis 5 in what Behe has said that leads you to that conviction?</p> <p>6 A His claim that such systems cannot be produced by 7 natural processes. In his original writings on this, he 8 says that's true by definition.</p> <p>9 Q Is that the opinion he holds today?</p> <p>10 A That was one of the criticisms that I had made of his 11 work in my book, and my understanding is that he has 12 agreed that that criticism is correct and that he 13 misstated his definition, he should not have put it in 14 that way. So I think he might want to rephrase his way 15 of putting it.</p> <p>16 Q Sure. Do you know whether he's revised his definition 17 in light of your criticism?</p> <p>18 A I continue to wait to see if he will give a revision of 19 that and other problems that I have pointed out.</p> <p>20 Q But as we sit here today, you're unaware of any such 21 revision?</p> <p>22 A That's correct.</p> <p>23 Q Do you know whether Behe rejects all of the elements of 24 evolutionary theory or just some of them?</p> <p>25 A So far as I know, he rejects some, but not all.</p>	<p style="text-align: right;">Page 112</p> <p>1 as in Behe's case. Dembski even more explicitly than 2 Behe says here is something that I've identified, this 3 property, specified information, which he claims can be 4 found in the world, and a challenge to evolution, but 5 not just to evolution, really to all of natural science, 6 the claim that such processes cannot in principle 7 produce such property. So on that hand, it's just a 8 challenge. And then on the other side is the claim that 9 the only way to produce CSI is by some transcendent 10 design, intelligence, some non-natural process.</p> <p>11 And so my assessment of Dembski is the same. On 12 the one hand, it's simply a challenge, and it's a 13 challenge that's been met so far as I can tell. And on 14 the other hand, it's something that's stepping outside 15 of science and thereby not being acceptable within it.</p> <p>16 Q And again, just to make sure I'm certain, do you 17 understand Dembski's inference of design to necessarily 18 entail recourse to supernatural causation?</p> <p>19 A As Dembski defines design in his treatment of the design 20 inference, it explicitly rejects the possibility that 21 natural processes could produce specified complexity. 22 Sometimes they'll talk about it in terms of chance and 23 necessity, sometimes they'll talk about it in terms of 24 randomness and law, so the terms he's used have been 25 different over time, he's not consistent about that, but</p>
<p style="text-align: right;">Page 111</p> <p>1 Q How about is Dembski's concept of specified complexity a 2 scientific theory?</p> <p>3 A So again, I would say CSI is not a theory, it's just a 4 purported property, he's claiming there is this thing 5 called complex specified information. It's often 6 unclear what he means by that, but he's purporting that 7 there is this feature, the same as Behe is purporting, 8 that there is this feature, so-called irreducible 9 complexity. So by itself, it's just a purported 10 concept.</p> <p>11 Q It's a claim?</p> <p>12 A CSI is not a claim, it's just a concept. He makes 13 claims about and with regard to other things, that's 14 right.</p> <p>15 Q Well, let's look at it this way. And I think I'm 16 learning a little from the way you approach Behe's work. 17 I suppose that Dembski's work has two 18 characteristics then, one is a claim that evolutionary 19 theory can account for specified complexity, and then 20 second, I suppose, learning from what you've said about 21 Behe, that he also makes a claim as an alternative 22 explanation for observed phenomena.</p> <p>23 If we look at Dembski's claims based on CSI, do you 24 regard those claims as a scientific theory?</p> <p>25 A So you've exactly given my response, which is the same</p>	<p style="text-align: right;">Page 113</p> <p>1 the general upshot of all of this is natural processes 2 can't do it. And the challenge to evolution is made in 3 terms of natural selection, random mutation, that can't 4 do it. But really, this is not a claim specifically 5 about evolution, it's a challenge, as is Behe's, to any 6 natural process.</p> <p>7 Q And am I correct that it's at the point where they point 8 to the possibility of supernatural causation that they 9 depart in your opinion from methodological naturalism?</p> <p>10 A Their very notion of what it means to say that something 11 was designed is to say this is transcended, this is 12 non-natural. The central point that they assume is a 13 rejection of the ability of the physical world, 14 chemical, physical processes, to produce irreducible 15 complexity or complex specified information, that's the 16 claim. So in advocating this as an alternative theory, 17 they're doing so by co-opting scientific terminology, 18 but really by rejecting scientific methods.</p> <p>19 Q How about in their, what shall I say, their effort to 20 identify irreducible complexity, does that in your 21 opinion necessarily entail a repudiation of 22 methodological naturalism?</p> <p>23 A Can you say that again? Does identifying?</p> <p>24 Q Yeah. In other words, as you say, as I understand, they 25 make a claim that there exists something called</p>

29 (Pages 110 to 113)

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 114</p> <p>1 irreducible complexity in nature which they purport to 2 have identified, is that facet of their claims a 3 departure from methodological naturalism in your 4 opinion?</p> <p>5 A So this is one of those cases where one has to ask what 6 does intelligent design theory say, so what's the 7 package. And their package does reject methodological 8 assumptions within science. It's unclear whether they 9 actually have identified such systems in nature. They 10 point to things that they say are irreducibly complex or 11 have complex specified information, but it's actually 12 never clear that they can even show in the cases that 13 they've mentioned that it fulfills that. They're 14 purported there, but it's to me still unsure as to 15 whether they've shown that. The overall view, though, 16 has as its basic assumption this rejection of the basic 17 methodological constraints of science.</p> <p>18 Q And let me see if I understand what you're saying in 19 your report. It seems that to the extent Behe claims 20 he's identified irreducible complexity, you believe as a 21 result of the computer work you've done, among other 22 things, I suppose, that he hasn't established that 23 claim, is that correct?</p> <p>24 A He hasn't established the claim that such a system 25 cannot be produced by the evolutionary mechanism. We've</p>	<p style="text-align: right;">Page 116</p> <p>1 transcendent causal power?</p> <p>2 A In defining design, essentially by negation, as not any 3 natural process, law, necessity, chance, randomness, 4 anything in the natural world, any material, physical, 5 chemical process.</p> <p>6 Q All right.</p> <p>7 A That's what he means by design there. And in some 8 places, that comes out explicitly, sometimes it comes 9 out informally.</p> <p>10 Q I want to ask you a question about a portion of Of 11 Pandas that you reference in your report, and it's at 12 page 7 of the text in this paragraph which reads "What 13 kind of intelligent agent was it? On its own, science 14 cannot answer this question, it must leave it to 15 religion and philosophy, but that should not prevent 16 science from acknowledging evidences for an intelligent 17 cause origin wherever they may exist."</p> <p>18 I don't know, Dr. Pennock, if you want to look at 19 that.</p> <p>20 A Yes. Where is that on the page?</p> <p>21 Q It's right here. And then as you look at that, do you 22 understand that as entailing a claim on the part of the 23 authors that science does demonstrate, or can prove, let 24 me say, the attributes of a designer?</p> <p>25 A Here the question has to do with, as you're asking the</p>
<p style="text-align: right;">Page 115</p> <p>1 shown that such systems can. Now, again, this is on the 2 assumption that I'm taking this as within the framework 3 of science. So when we look at a program that has 4 evolved, a computer organism that's evolved, and we see 5 that it can perform a certain function and we see that 6 if you knock out these instructions that it stops 7 functioning, so that's the sense in which you'd say, 8 look, here we're fulfilling a definition of irreducible 9 complexity, and furthermore, we've seen that it evolved, 10 so that's the sense in which I'd say, look, if it's just 11 a challenge to evolution, in that sense, the challenge 12 has been answered. But of course, that's not the whole 13 view.</p> <p>14 To say, as Behe does, I purport to be an 15 intelligent design theorist, this is an alternative 16 theory, that particular challenge isn't all that there 17 is. There's the rest of the story, as well, which 18 includes this other part, only a non-natural process, 19 only an intelligent transcendent being could produce 20 such complexity. For Dembski, it's even clearer in his 21 explanatory filter itself that non-natural notion is 22 built in, built in to the very definition.</p> <p>23 Q In what way?</p> <p>24 A In the way that he defines design.</p> <p>25 Q As necessarily entailing, as you understand it, a</p>	<p style="text-align: right;">Page 117</p> <p>1 question, the attributes of the agent, of the 2 intelligent agent, and the claim here is science can't 3 answer the question about the attributes of an 4 intelligent agent. Is that right?</p> <p>5 Q That's what I'm asking -</p> <p>6 A "On its own, science cannot answer this question." So 7 what's the upshot of those claims, those particular 8 sentences? So that's actually a nice example to show 9 the way in which on the intelligent design view they're 10 using terms in non-standard ways.</p> <p>11 So under ordinary scientific norms, methodological 12 naturalism and so on that we've been talking about, 13 scientists do make inferences about someone who did 14 something. Okay? The example here was from archeology. 15 And decipher the symbols when an archeologist discovers. 16 But notice the claim that's being made here. It says we 17 can make no - draw no conclusions about their 18 attributes. But in fact, in the ordinary sense in which 19 we draw conclusions about someone built something, that 20 someone built the pyramids, that someone in this case 21 wrote these symbols, the hieroglyphics on the stone, 22 science actually draws all sorts of inferences. We 23 regularly draw inferences about a person, another human 24 being, another natural being who did something. And 25 it's totally bizarre to say that science can't say</p>

30 (Pages 114 to 117)

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 118</p> <p>1 anything about the attributes of that ordinary kind of 2 designer.</p> <p>3 So if we're talking about this in the ordinary 4 sense of the term, then you'd say but of course we do 5 that, archeologists do that, we do that in sort of 6 everyday cases. You can determine something about 7 another person because you have all sorts of causal 8 knowledge, prior knowledge about other people, they're 9 like me, we know something about them and so on. And so 10 under the ordinary notion of this, you could say someone 11 likely did it and here's probably how they did it, 12 here's probably why they did it, here's probably what 13 they were thinking, we have all sorts of information to 14 draw on in that case.</p> <p>15 So this kind of a statement or the way you were 16 posing the question, science can say nothing about the 17 attributes, indicates already that they're using the 18 term "design" in a really different way. What is that 19 way? Well, it's the way we've been talking about, 20 they're using design in this way that departs from the 21 natural notion. And so I think that that's what's going 22 on here. If we're talking about supernatural beings and 23 powers, there's nothing that we can say about that, 24 that's the whole point.</p> <p>25 Q Well, just let me ask you so I can understand here.</p>	<p style="text-align: right;">Page 120</p> <p>1 A In the case of archeology?</p> <p>2 Q Yes.</p> <p>3 A The inference that's -- inferences that one draws in an 4 archaeological case are based upon sort of the ordinary 5 information that we have about human beings, their 6 needs, desires, abilities, and so on. So we can 7 actually say quite a bit about that.</p> <p>8 Q And if I'm not mistaken, that's referred to as a sort of 9 uniformitarian reasoning in science, is that true?</p> <p>10 A Uniformitarian reasoning simply has to do with 11 consistency of inferences. Sometimes it's put in terms 12 of laws of nature so that if you see a law in place, 13 cause/effect in this circumstance, that in this new 14 case, if you have the cause in the same circumstance, 15 you will similarly get the same effect. So that's the 16 notion of how these lawful processes operate in a 17 uniform way.</p> <p>18 Now, the reason I'm saying a little bit more about 19 this is because historically, uniformitarianism 20 sometimes got associated with particular views about 21 particular processes. Actually, the main case in which 22 this got debated had to do with the nature of geological 23 processes. And so I didn't mean to confuse it with that 24 and I didn't know if you were referring to those kinds 25 of cases.</p>
<p style="text-align: right;">Page 119</p> <p>1 The authors advance a claim that the evidence 2 points to an intelligent agent, is that correct?</p> <p>3 A This particular sentence that says "What kind of 4 intelligent agent was it?" Is that what you're pointing 5 to?</p> <p>6 Q Yes.</p> <p>7 A Okay.</p> <p>8 Q And you've pointed out that in certain cases, based on 9 the totality of the circumstances, the totality of the 10 evidence, we can advance additional inferences about a 11 given agent such as in the examples you gave, is that 12 correct?</p> <p>13 A Yes, we do that all the time in science.</p> <p>14 Q Okay, I see that. But could we not reach a point where 15 we lack adequate evidentiary basis to venture further 16 inferences about a given agent?</p> <p>17 A I'm not sure what you're pointing to there. Can you --</p> <p>18 Q I'll try --</p> <p>19 A Just say that again, yeah. Sorry.</p> <p>20 Q Well, I take your point now and understand it better 21 from your example.</p> <p>22 What I'm trying to get at is it seems to me there's 23 a certain point at which the evidence is insufficient to 24 venture additional inferences about a given agent, is 25 that true?</p>	<p style="text-align: right;">Page 121</p> <p>1 Q No. I may have --</p> <p>2 A Often the intelligent design folks will sort of mix 3 those up.</p> <p>4 Q Well, I guess what I'm trying to get at is you have 5 pointed out that ordinarily, we can advance inferences 6 about the results of intelligence -- let me put that a 7 different way.</p> <p>8 Ordinarily, we can detect intelligence and make 9 inferences about the attributes of the intelligent 10 agent, is that correct?</p> <p>11 A What I've said is that we can in ordinary circumstances 12 under the basic assumptions of methodological naturalism 13 draw conclusions about other natural beings like 14 ourselves.</p> <p>15 Q Isn't there a point at which we don't know enough about 16 particular causes to venture additional inferences, we ... 17 lack sufficient knowledge?</p> <p>18 A So you're saying with regard to conclusions about other 19 human beings and their motives and purposes and so on, 20 is there some limit to that? The answer is yes. I can 21 infer some things about you, about another human being, 22 and there are other things that I may lack data for. 23 And the same is going to be true for archeological 24 studies, as well. We'll be able to say some things 25 about ancient peoples, essentially to the degree that</p>

31 (Pages 118 to 121)

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

Page 122

1 they're like us, I mean, it's on that basis that we're  
 2 saying that they did this for that reason, but there  
 3 will be other things where we won't. It will depend  
 4 upon the data we have. But those are things where  
 5 evidence can be found, conclusions drawn, because we  
 6 have this information about other natural beings, other  
 7 people.  
 8 Q And don't those limits turn in some measure on the  
 9 existing body of scientific knowledge at a given point?  
 10 A The inferences that we draw do depend essentially on the  
 11 information that we have, that was the point that I was  
 12 trying to make. It's to the degree that we have this  
 13 information, that we know what human beings can do, what  
 14 their purpose is, motives are, that we can conclude  
 15 something. And there are going to be some things that  
 16 we don't know. If we were to then learn something new  
 17 about human beings in general or something more  
 18 specific, that could then allow us to draw further  
 19 conclusions. But that's like any other feature in  
 20 science, any other study in science.  
 21 Q And I guess we're speaking here specifically about the  
 22 limits of scientific knowledge?  
 23 A Right, I take it that the question here was with regard  
 24 to something like archeology like where you're doing a  
 25 scientific investigation of that, yes.

Page 123

1 Q Well, and I guess going back to that portion of this  
 2 text here where they say on its own, science cannot  
 3 answer this question, is that just an acknowledgment of  
 4 the current limitations of scientific knowledge or do  
 5 you understand it differently?  
 6 MR. SCHMIDT: The question, are you asking for his  
 7 understanding of what the intent of the authors was or  
 8 whether he agrees with that statement?  
 9 MR. GILLEN: I guess I'm asking him whether he  
 10 understands this assertion to be one concerning the  
 11 limits of scientific knowledge at this time.  
 12 MR. SCHMIDT: Object to the form, but go ahead and  
 13 answer it if you can.  
 14 A So I'm a little confused as to this. So my claim about  
 15 that sentence had to do with the way I thought you  
 16 initially posed the question, which had to do with isn't  
 17 it fair to say that science can't say anything about the  
 18 attributes of the designer, and that's something we had  
 19 talked about several times previously, do intelligent  
 20 design advocates say you can or can't. And in many  
 21 places, like this, they say you can't. In other places,  
 22 they say quite explicitly God, this particular version  
 23 of Christianity is supported. So there's some  
 24 inconsistency about that.  
 25 My point here was to say that kind of a statement

Page 124

1 indicates just how unscientific this is in the sense  
 2 that it's making a claim and pointing to religion and  
 3 philosophy, where in the ordinary notion of the terms,  
 4 if we were talking about this in the ordinary way, we  
 5 would never say something like that, you don't need to  
 6 point to religion and philosophy at all when we're  
 7 asking about those other kinds of inferences, the  
 8 natural ones.  
 9 BY MR. GILLEN:  
 10 Q I think I'm understanding you more clearly now, we'll  
 11 just see if I do. In other words, if this were an  
 12 acknowledgment of the limits of scientific knowledge as  
 13 you see it, they would simply say we cannot say at this  
 14 time? In other words, they would respond to what kind  
 15 of intelligent agent was it not by pointing to religion  
 16 or philosophy, but by saying we don't know, is that  
 17 correct?  
 18 A So I guess I still don't understand the point of the  
 19 question.  
 20 Q Okay, that's fine. I guess what I'm saying is in your  
 21 opinion, based on what you've said, if the authors were  
 22 engaged in scientific inquiry as you understand it  
 23 guided by methodological naturalism, then if they ask  
 24 the question what kind of intelligent agent was it, they  
 25 would -- the scientific answer is we do not know at this

Page 125

1 time, period?  
 2 A No, that's -- maybe I'm confused in the sense that  
 3 you're asking me what I think they might have been  
 4 saying with regard to that. My point with regard to  
 5 this was simply to point out that the way in which  
 6 they're using these terms isn't respecting the  
 7 constraints of methodological naturalism.  
 8 Q Because they're reaching out to a metaphysical  
 9 possibility?  
 10 A Exactly. And you can sort of see that in the way that  
 11 they're gesturing to religion and philosophy. So it's  
 12 simply another indication of what I've been pointing to  
 13 before, which is an inherent rejection of that essential  
 14 scientific feature.  
 15 Q Let me do this.  
 16 MR. GILLEN: Would you please mark this as 2?  
 17 (Exhibit Number 2 was marked for identification.)  
 18 BY MR. GILLEN:  
 19 Q And I believe you've seen this before, Dr. Pennock,  
 20 it's --  
 21 A Um-hmm, yep.  
 22 Q -- the biology curriculum press release, and I'd ask you  
 23 to -- let's see. I'll direct your attention to the  
 24 indented paragraphs there.  
 25 MR. SCHMIDT: The paragraphs in italics at the

32 (Pages 122 to 125)



ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 126</p> <p>1 bottom?</p> <p>2 MR. GILLEN: Yeah.</p> <p>3 BY MR. GILLEN:</p> <p>4 Q Beginning at bottom there, the two there and carrying</p> <p>5 over to the next page.</p> <p>6 A "Students will be made aware of," that --</p> <p>7 Q We'll start there. And basically what I want to do is</p> <p>8 get your take on this statement in light of your</p> <p>9 professional training. There's some assertions here I</p> <p>10 just want to check with you. "Students will be made</p> <p>11 aware of gaps/problems in Darwin's theory."</p> <p>12 If we stop there, I think you've already said that,</p> <p>13 that there are gaps and problems in Darwin's theory that</p> <p>14 scientists are working on at this time, is that true?</p> <p>15 A I don't think we've talked about gaps and problems in</p> <p>16 evolution. What I would say is that there are many open</p> <p>17 questions, there are research questions. That's not the</p> <p>18 same thing as saying it's a problem for the theory.</p> <p>19 It's there's more to find out.</p> <p>20 Q Well, are there issues as to which different proponents</p> <p>21 of evolutionary theory take different positions that are</p> <p>22 currently in dispute in the scientific community?</p> <p>23 A So with regard to specific hypotheses within</p> <p>24 evolutionary theory, one could say we don't yet know the</p> <p>25 answer to X. Does natural selection have the ability to</p>	<p style="text-align: right;">Page 128</p> <p>1 Now, Tom and I have pondered over this phrase, and</p> <p>2 let me ask you, do you regard intelligent design theory</p> <p>3 as a theory of evolution?</p> <p>4 MR. SCHMIDT: This is another one of those</p> <p>5 opportunities.</p> <p>6 A So your question is do I regard intelligent design as a</p> <p>7 theory of evolution?</p> <p>8 BY MR. GILLEN:</p> <p>9 Q Yeah.</p> <p>10 A It's hard to imagine it as any sort of scientific</p> <p>11 theory, certainly not a theory of evolution. I mean,</p> <p>12 they're rejecting evolution in its broad sense. So I</p> <p>13 find that hard to understand.</p> <p>14 Q And let me just make sure I understand. That's because</p> <p>15 when you use the term "evolution," you're looking at it</p> <p>16 in terms of the scientific theory that you've described</p> <p>17 earlier today, is that correct?</p> <p>18 A That's correct.</p> <p>19 Q If you drop down to these two paragraphs at the bottom</p> <p>20 of that first page of Exhibit 2, the second paragraph</p> <p>21 starts with "Because Darwin's Theory is a theory, it</p> <p>22 continues to be tested as new evidence is discovered."</p> <p>23 In terms of your professional training and</p> <p>24 expertise, is that accurate, is Darwin's theory a</p> <p>25 theory, for example?</p>
<p style="text-align: right;">Page 127</p> <p>1 in a particular case have organisms evolve altruistic</p> <p>2 behavior, just for example, under what circumstances can</p> <p>3 that happen. So one could call that a research problem</p> <p>4 or one could call that a research question, but I</p> <p>5 wouldn't say that that's a problem with the theory, I</p> <p>6 would just say that that's a research question,</p> <p>7 something that we're investigating.</p> <p>8 Q Okay.</p> <p>9 A I wouldn't call it a gap in the theory, I would just say</p> <p>10 here's a question that we're investigating, trying to</p> <p>11 find the answer to. At a particular point in time, one</p> <p>12 or another scientist may think, oh, I bet it's this,</p> <p>13 another one may say, oh, I bet it's that, so there's</p> <p>14 disagreement, but that's not the same thing as saying</p> <p>15 it's a gap in the theory or a problem, it's just a</p> <p>16 research question.</p> <p>17 Q Okay.</p> <p>18 A As in any scientific theory, evolution is in no way</p> <p>19 exceptional. Every time you learn something, it gives</p> <p>20 rise to another interesting question. So there isn't a</p> <p>21 sense of which one would call that a problem, that's</p> <p>22 actually part of a progressive research program.</p> <p>23 Q It continues with the reference to other theories of</p> <p>24 evolution, including but not limited to intelligent</p> <p>25 design.</p>	<p style="text-align: right;">Page 129</p> <p>1 A So the thing I want to say with regard to that kind of</p> <p>2 phrasing is to just point out what it means in different</p> <p>3 settings to say something is a theory. Even here in the</p> <p>4 way the wording is given, "Darwin's Theory" is given a</p> <p>5 capital T and the other is given a lower case T. So</p> <p>6 even within that very sentence they're sort of</p> <p>7 acknowledging the term "theory" as having multiple</p> <p>8 meanings. So my answer about this is, well, is it true?</p> <p>9 Well, it's going to depend on what we mean by theory.</p> <p>10 So if the question is, is Darwin's theory a</p> <p>11 scientific theory, the answer is yes. Like</p> <p>12 gravitational theory, like cell theory, and so on, it is</p> <p>13 a well confirmed set of hypotheses that have been</p> <p>14 tested, so in that sense it's so. But in the colloquial</p> <p>15 sense of is it a theory, by which one means here's a</p> <p>16 guess I have, here's my theory, what's your theory,</p> <p>17 something that's just put forward on no basis or out of</p> <p>18 nothing or little, in that sense, the answer is no, it's</p> <p>19 not a theory in that sense.</p> <p>20 And this appears to be ambiguous. "It continues to</p> <p>21 be tested as new evidence is discovered." Again, that</p> <p>22 reads to me as problematic because of these shifting</p> <p>23 notions. In the sense that we were talking about</p> <p>24 before, there are research questions that come about</p> <p>25 which scientists then test. But it's not as though</p>

33 (Pages 126 to 129)

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 130</p> <p>1 those parts of the theory, and I went through some of</p> <p>2 them, we'd have to really focus on particular ones to be</p> <p>3 able to answer the status of them in a particular case,</p> <p>4 it's not as though those are all equal. In some cases,</p> <p>5 they're just well confirmed and they're not continually</p> <p>6 tested because we already know the answer to that. In</p> <p>7 other cases, the evidence is ambiguous and we're still</p> <p>8 trying to find ways to resolve it, is it this way or</p> <p>9 that way. But that has to be answered with regard to</p> <p>10 particular hypotheses.</p> <p>11 So in a general scientific sense, I'd say yeah,</p> <p>12 like any other scientific theory, there are open</p> <p>13 research questions and we're continuing to try to find</p> <p>14 answers to them and we're giving tests, performing</p> <p>15 experiments, to try to answer that.</p> <p>16 But then you're going to, I think, ask me about the</p> <p>17 next --</p> <p>18 Q Yeah.</p> <p>19 A -- sentence, which is sort of the reason for my --</p> <p>20 Q Reservation?</p> <p>21 A -- reservation here.</p> <p>22 Q And tell me about that, Dr. Pennock, what is it about</p> <p>23 that observation that "The theory is not a fact" that</p> <p>24 you find problematic?</p> <p>25 A So that sentence, "The theory is not a fact," is part of</p>	<p style="text-align: right;">Page 132</p> <p>1 Q Let me ask you, if we look at Darwin's theory in the</p> <p>2 scientific sense of the term, is it your opinion that</p> <p>3 that is a scientific fact?</p> <p>4 A So as we talked about before, evolutionary theory -- and</p> <p>5 it's actually sort of a misnomer to say Darwin's</p> <p>6 theory --</p> <p>7 Q Yeah.</p> <p>8 A -- because Darwin was 150 more years ago and</p> <p>9 evolutionary biology has progressed a lot since then, so</p> <p>10 I actually rarely say Darwin's theory unless I'm</p> <p>11 specifically talking about some things that Darwin did,</p> <p>12 and more generally the question is evolutionary theory,</p> <p>13 evolution, what do we know. And as I described at the</p> <p>14 beginning when you asked me what do I understand by</p> <p>15 evolution, what I tried to do was to say evolution</p> <p>16 includes a whole bunch of different things. I classed</p> <p>17 them into three different kinds, but there are actually</p> <p>18 people who have a more fine-grained classification, I</p> <p>19 mean, there's just a whole range of things that are</p> <p>20 included in there. And those interlinked hypotheses,</p> <p>21 like hypotheses in other fields, are tested,</p> <p>22 investigated, experimented upon to confirm them, and at</p> <p>23 the point where you say we have good and sufficient</p> <p>24 evidence, you say we have a theory that's factual, we</p> <p>25 have a hypothesis that's confirmed.</p>
<p style="text-align: right;">Page 131</p> <p>1 why I was highlighting that definitional issue in the</p> <p>2 first place. This tells us, oh, we need to go back and</p> <p>3 take a look at that. And what's being highlighted here</p> <p>4 is the colloquial notion of theory, which is something</p> <p>5 that's in contrast to a fact. Theory versus fact. And</p> <p>6 in ordinary, on-the-street language, those are</p> <p>7 opposites.</p> <p>8 Scientifically, those are not opposites, nor</p> <p>9 philosophically are they opposites. Theories can be</p> <p>10 factual. If it's well tested, well confirmed, you have</p> <p>11 the support, you'd say the theory is a fact, we've</p> <p>12 confirmed it. And so the scientific notion that's</p> <p>13 relevant there doesn't admit of this kind of contrast.</p> <p>14 And so that's the sense in which this is sort of</p> <p>15 inherently misleading.</p> <p>16 Q And again, just so I understand you, what is the</p> <p>17 scientific notion of theory that makes that statement</p> <p>18 "the theory is not a fact" misleading?</p> <p>19 A It's misleading because in the ordinary sense of the</p> <p>20 terms, "theory" and "fact" are opposite, but in the</p> <p>21 scientific sense of the term, "theory" just relates</p> <p>22 to -- or in this case can relate to a set of hypotheses</p> <p>23 that are well confirmed and judged then to be factual,</p> <p>24 so these are not opposite in the scientific senses of</p> <p>25 the term.</p>	<p style="text-align: right;">Page 133</p> <p>1 Now, a theory isn't just one hypothesis, it's all</p> <p>2 of these things, so it's sort of odd to say is Darwin's</p> <p>3 theory a fact, or even is evolutionary theory a fact,</p> <p>4 because scientifically you recognize the complexity of</p> <p>5 that, and to say that something is a fact or that</p> <p>6 something is true in science always comes, or at least</p> <p>7 ought to always come with the evidentiary assignment to</p> <p>8 it how well confirmed is it. In some cases, some things</p> <p>9 are so well confirmed that it's hard to even conceive</p> <p>10 how some new fact could come and overturn it.</p> <p>11 Q And is that so in Darwinian -- or evolutionary theory?</p> <p>12 A In evolutionary theory, some of these things are just so</p> <p>13 well confirmed now that it's -- it really is hard to</p> <p>14 imagine what could come our way with regard to new</p> <p>15 evidence that could overturn it. Now, that's not to say</p> <p>16 that it couldn't happen in principle, philosophers</p> <p>17 always come up with these hypothetical science fiction</p> <p>18 examples where we live in the matrix and our entire</p> <p>19 knowledge of the world is fallacious, but aside from</p> <p>20 those sorts of things, sort of from a practical</p> <p>21 understanding, there's some things where in evolution we</p> <p>22 think we just know this is true. Not all aspects of</p> <p>23 evolutionary theory are equally well confirmed and no</p> <p>24 one would say that they were. The question is for the</p> <p>25 ones that are less well confirmed, can we get further</p>

34 (Pages 130 to 133)

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 134</p> <p>1 evidence, for ones where we don't know the answer, we 2 just have a question, is there a way to get data to find 3 an answer. 4 But the general point is to say with regard to the 5 central textbook commitments of the view, to say is this 6 well confirmed, the answer is yes. Is it factual? The 7 answer is yes, so long as one is always thinking 8 scientifically and you know that at least conceivably 9 there could be something that comes out of left field. 10 But for many of these core hypotheses, the evidence is 11 just scientists will just say, again, in the end, 12 overwhelming, I think they're at the point where they 13 say this is just a fact, I can't even imagine how this 14 could be otherwise now. 15 Q And just to make sure I'm understanding you, it sounds 16 to me like what you're saying is some hypotheses have 17 such confirmation that they're regarded as fact, is that 18 accurate? 19 A That's right. 20 Q How about the definition of theory that's in that second 21 paragraph, "A theory is defined as a well-tested 22 explanation that unifies a broad range of observations," 23 is that an accurate definition of theory in your 24 opinion? 25 A It's an oversimplified view of the sort of things that</p>	<p style="text-align: right;">Page 136</p> <p>1 Q Okay. Let me ask you to look to the next page, and 2 you'll see there the next indented paragraph begins with 3 the observation or statement that intelligent design is 4 an explanation of the origin of life that differs from 5 Darwin's view. 6 Is that accurate in your -- does intelligent design 7 purport to be an explanation of the origin of life? 8 A Intelligent design purports to be an explanation. 9 There's several things about this sentence that are odd 10 and that specifically is focusing on the origin of life. 11 Whereas, as we mentioned before, Darwin himself was not 12 concerned with the origin of life, in his view, it was 13 about the origin of species. So to say that this is 14 something that differs from Darwin's view of the origin 15 of life seems to totally misunderstand what Darwin 16 himself was thinking of. He didn't have -- his theory 17 wasn't about that. 18 But the key thing here is intelligent design is an 19 explanation of X, origin of life, whatever. And what's 20 the status of that? So again, this takes us back to the 21 notion of what it is to be a scientific explanation. So 22 one could say intelligent design is an explanation in a 23 colloquial sense, say yeah, that's a possible 24 explanation, maybe God did do it, or, you know, the 25 designer, maybe the supernatural designer did do it like</p>
<p style="text-align: right;">Page 135</p> <p>1 we had talked about before. So a theory is a 2 constellation of hypotheses which can include causal 3 laws, particular features of the world, a whole range of 4 things which then explain other things. So in that 5 sense, what theories do is provide explanations of 6 phenomena, so in that sense, this notion here of a 7 well-tested explanation, that's right. The point about 8 unifying a broad range of observations, that is often 9 the case. It is the case in evolution. It doesn't 10 always work that way. 11 I didn't mention it earlier, but when we were 12 talking about explanation, the philosophical accounts of 13 explanation, one that I didn't bring up, there's 14 actually a whole range of them, but one of them that I 15 didn't bring up was the unification account, so what it 16 is to be an explanation is that it unifies. Even the 17 person who advanced that now doesn't agree that that's 18 the right explication of what it is to be an 19 explanation, but that was out there in the literature 20 and discussed for quite a while. Even though that 21 turned out to be wrong, there still is a case in which 22 unification can be important as a virtue in explanation. 23 You could say this is a really good explanation because 24 it unifies so much. And that's certainly true of 25 evolution.</p>	<p style="text-align: right;">Page 137</p> <p>1 this, but that's not to say that it's a scientific 2 explanation of this. And because it's not clear with 3 regards to that and it's sort of trading on this sort of 4 ambiguity and because, as we've seen before, intelligent 5 design is departing from the scientific notion of an 6 explanation, I'd say that this is problematic. 7 Q Does evolutionary theory address the origin of life? 8 And here I mean the sort of neo-Darwinian synthesis as 9 it's sometimes called? 10 A So that question gets into the specifics of what part 11 addresses what. The neo-Darwinian synthesis is a 12 particular historical scientific event where one strand 13 of biology merged with another strand, essentially folks 14 who were naturalists, not in the sense that we were 15 talking about before, but naturalists in the sense of 16 going out and looking at macroscopic objects, trees and 17 plants and butterflies and insects and so on, and all 18 the information that they had acquired about taxonomy, 19 morphology, interrelationships among organisms, 20 combining with another strand, genetics, and showing how 21 evolution as understood by the naturalists was supported 22 by independently and by joining together the concepts 23 with what was learned in genetics. So that 24 neo-Darwinian synthesis is explicitly this era and what 25 arose out of it, so focusing on changing gene</p>

35 (Pages 134 to 137)



ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 138</p> <p>1 proportions in a population that's evolving over time, 2 those are elements of a neo-Darwinian synthesis. 3 That specific historical research episode wasn't 4 specifically dealing with the origin of life. We are 5 now, later on, I mean, this is quite a bit later even 6 from the neo-Darwinian synthesis, doing evolutionary 7 theory, and there are all sorts of things that sort of 8 broadly get included or maybe are on the fringes that 9 you may or may not include. Typically, origin of life 10 studies is not within that professional study, origin of 11 life researchers typically sort of come from a different 12 way. In part because what evolution is mostly dealing 13 with is what happens to life as it evolves, new species 14 and so on. 15 Now, in a broader sense, one wants to connect that 16 picture to an earlier picture whereby life first got 17 started, and so certainly people who do origins of life 18 research will want to merge and connect with this, but 19 again, the mechanisms of the core elements of what we've 20 talked about before, evolutionary theory, have to do 21 with the tree of life, not with what came from before 22 there was life to life. Although they'll certainly be 23 connected, things that we know about the one will have 24 to be explained by the other, you have to sort of see 25 how you get these things going.</p>	<p style="text-align: right;">Page 140</p> <p>1 broader way, it may not -- may or may not have anything 2 specifically to do with the Darwinian mechanism. 3 On the other hand, there might be chemical 4 processes that also instantiate something like the 5 Darwinian mechanism, and in that case, you would more 6 easily fit this under the umbrella, very naturally you'd 7 fit this under the umbrella. But that's an area of 8 research where we still have a long way to go. 9 Q Let me just ask you a few questions about some other 10 concepts we've talked about here. You know, plainly, as 11 your report indicates, one feature of this discussion 12 about evolutionary theory relates to paleontology and 13 sort of historical biology. Now, I just want to get a 14 sense for the way in which those claims are proven. 15 It seems evident those are not proven in terms of 16 what you call the gold standard for scientific proof, is 17 that correct? 18 A Can you say what -- paleontology is a big field, so do 19 you have something -- 20 Q I mean that portion of it that's devoted to sort of 21 lining out this tree of life you've discussed, exploring 22 the relationships between various species over 23 historical time. 24 I guess my question to you is, is it appears to me 25 from reading your report and Dr. Padian's report that</p>
<p style="text-align: right;">Page 139</p> <p>1 So typically in a textbook, you'll have some brief 2 mention of that, but most evolutionary biologists would 3 say, well, that's not really part of evolutionary 4 theory, per se, and at our Society for the Study of 5 Evolution meetings, it would be pretty rare to have 6 someone speak about origin of life, per se. You might 7 have that occasionally, but that's not generally part of 8 that, they'll have their own conferences. 9 Q That's interesting, I've never heard this before. So is 10 it your understanding that the area of scientific 11 investigation focused on the origin of biological life 12 which has been sort of loosely described as the, what 13 shall we say, origination of biological life as a result 14 of chemical components is not typically considered to be 15 within evolutionary biology? 16 A Again, this is something where the professional 17 boundaries are somewhat fuzzy. Obviously, there have to 18 be connections there because we think of this as 19 continuity. But typically what evolutionary biologists 20 have studied is the origin of species and what happens 21 sort of as the tree of life grows and not concern 22 themselves directly with how life itself got started. 23 But folks who do origins of life research will sometimes 24 talk about chemical evolution, so in that sense, you're 25 sort of using the term "evolution" in the slightly</p>	<p style="text-align: right;">Page 141</p> <p>1 that's a question that is sort of reasoned inferences 2 from the evidence, is that correct in your opinion? 3 A As I had said before in talking about, quote, the gold 4 standard, that had to do with randomized controlled 5 experiments and that there were various ways in which 6 one tested causal hypotheses, but that was the key one, 7 and that once one has knowledge of causal processes, 8 that you've found out in this way, then you can go on 9 and draw inferences using them. So if we know, because 10 we've tested, that C causes E in this circumstance, then 11 in a different case we can go on and say, well, we 12 know -- we see that the circumstance holds and we see 13 the effect, so there must have been that cause, so it 14 actually does make use of this information that we have 15 gathered using experimentation. 16 So certainly, paleontology is no different with 17 regard to that. Just to give an example, when a 18 paleontologist looks at rock strata and draws a 19 conclusion about which organisms were prior in time to 20 others, they're making use of causal knowledge that 21 they've gotten in other ways. It might be as simple as 22 causal knowledge about how deposition happens and how 23 rock strata are formed. A law in geology that a 24 paleontologist would use would be something like the law 25 of superposition, it's a pretty simple one, that</p>

36 (Pages 138 to 141)



ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 142</p> <p>1 something that's on top is usually younger than 2 something that's underneath. Now, it actually gets 3 pretty complicated because there are actually geological 4 processes, causal processes that we know of and have 5 tested and observed that could turn something upside 6 down. So it does get pretty complex. 7 But in fact, in appealing to those causal 8 processes, we can then draw a conclusion about the 9 proper ordering of the geological column and the fossil 10 record. So paleontologists are regularly making use of 11 those sorts of causally confirmed processes to draw 12 their inferences. 13 Q Okay. But doesn't some of their endeavor include 14 comparing various hypotheses which cannot be tested? 15 A Can you give me an example? I don't -- 16 Q I will. And forgive me, I'm not trying to make this 17 difficult, I'm just trying to get your view on it. For 18 example, the guy who directed Kevin Padian's Ph.D. 19 dissertation had a theory that the feathers they 20 believed certain dinosaurs had at a certain stage were 21 used to trap insects for food, and I just want to get 22 your opinion on that. It seems to me that that is not a 23 testable hypotheses. 24 Do you regard it as testable? 25 A This is the first time I'm hearing this example, so just</p>	<p style="text-align: right;">Page 144</p> <p>1 decisive evidence, so we might not be able to do that. 2 On the other hand, maybe we could get pretty strong 3 evidence, maybe a fossil, you'll be able to find a 4 fossil of an insect stuck in feathers. I could imagine 5 things of that sort. So they're testable claims. 6 Q I guess the term "testable" seems more malleable than I 7 appreciated. Let me ask you this. 8 Do you believe that common descent as posited by 9 biology is testable? 10 A Is common descent testable? Certainly, yes. 11 Q Has common descent been proven? 12 A Common descent as a general thesis has broad and deep 13 evidential support. You specifically used the term 14 "proven," which we haven't talked about yet, so if I 15 might just highlight that, that has a similar ambiguity 16 in the scientific sense and the colloquial sense. And 17 what I mean to say here, to say has something been 18 proven scientifically is has it been sufficiently 19 tested. So that notion of proof sometimes gets used in 20 a deductive sense where to prove something is to show 21 with absolute certainty that the conclusion holds. And 22 that's not the case, nothing in science is proven in 23 some absolute sense of that sort, unless one is just 24 doing a calculation, you can say here's the result of 25 the calculation and then that is math, that is logic.</p>
<p style="text-align: right;">Page 143</p> <p>1 to make sure I understand it, so the hypothesis was 2 feathers, early evolved feathers, were useful for 3 trapping insects? 4 Q Correct. 5 A So the question is, is that testable or not? 6 Q Yeah. 7 A Okay. So my general answer would be in principle, it is 8 testable. And in the same kind of way that I've 9 indicated before, what one does is use the causal 10 knowledge that one has and that one can do experiments 11 on now, so the experiments are done currently, can this 12 do that. If it had turned out that feathers were such a 13 thing that they couldn't trap insects, that would have 14 been a pretty good bit of evidence to say his hypothesis 15 is wrong. So investigations that we can do here and now 16 can test things about what happened before. There are 17 all sorts of similar kinds of tests, hypotheses, causal 18 information that we could get, that we either have or 19 could have, could gather, that would shed light upon 20 that and tell one way or the other. 21 Is it such that we could be in a position to say, 22 as we do about some other evolutionary hypotheses, this 23 is overwhelming and we now know this is a fact? Well, 24 maybe, maybe not. The further one goes into the past, 25 the less likely it is that you can get that kind of</p>	<p style="text-align: right;">Page 145</p> <p>1 But the ordinary notion of proof in science is the 2 inductive notion, which is just to say degree of 3 evidential support. And so common descent has very 4 strong evidential support from multiple lines of 5 evidence to the degree that one would say this is 6 factual. Now, again, there are always nuances with 7 regard to details, is there a single root to the tree of 8 life, are there multiple roots, how are those things 9 connected, so there's much that one could still say, but 10 in terms of the overall evidence for the general notion 11 that organisms are related in a tree of life, yes. 12 Q And I don't mean to use the term "proven" in any 13 colloquial sense. It seems like, if I'm understanding 14 you correctly, from the scientific standpoint, it's a 15 question of confirmation and strength of confirmation, 16 is that accurate? 17 A Philosophers try to be more precise in the language that 18 they use, and we typically talk about confirmation as 19 the central term, we talk about confirmation theory, is 20 this well confirmed, how well confirmed is this, 21 et cetera, et cetera, and when we use the term is 22 something proven, you always have to give that caveat, 23 say, well, to what degree, proven to what degree. So 24 that would be my preferred way of speaking about this. 25 In the terminology as scientists use it, you have</p>

37 (Pages 142 to 145)

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 146</p> <p>1 more variability. Sometimes scientists will say, oh,  2 science never proves anything. In part, that could come  3 from an earlier philosophy of science where it's thought  4 that science doesn't prove, it only disproves, so  5 sometimes you'll get scientists now who under that old  6 influence will make the claim that it's only disproof,  7 not proof. But a philosopher of science would say,  8 well, no, we've got past that notion, and if we take  9 proof in the inductive sense rather than the deductive  10 sense, then science can prove things, and it proves them  11 inductively in the sense that there is a degree of  12 strength in the evidence that's available.  13 Q Well, how about the mechanism of natural selection as  14 opposed to — as applied to species that existed in the  15 past, has the operation of natural selection been  16 confirmed?  17 A Natural selection, as well, as a process has been  18 confirmed. That's the sort of thing that we were  19 talking about before with evolutionary experimentation  20 that our group does, you can test how the Darwinian  21 mechanism works, you can test how natural selection  22 works and confirm hypotheses about it, so in that sense,  23 the efficacy of natural selection is testable and well  24 confirmed. There are —  25 Q But — go ahead, I'm sorry.</p>	<p style="text-align: right;">Page 148</p> <p>1 occurred, then you may infer it was this cause, or you  2 have evidence that there was that cause. So you can get  3 evidence for that.  4 Q Just a few other terms I want to ask you about. One of  5 the things that's a term that appears in some of the  6 reports is "purposeless." And I wanted to ask you do  7 you have an opinion concerning whether purposelessness  8 can be tested?  9 MR. SCHMIDT: Is that a term that Dr. Pennock wrote  10 in —  11 MR. GILLEN: I don't recall if —  12 A I don't think I used the term that I remember, but if  13 you could point to that, I —  14 BY MR. GILLEN:  15 Q Do you have an opinion concerning whether  16 purposelessness can be tested for?  17 A Is there a particular claim about purposefulness or  18 purposelessness?  19 Q Well, that's — I guess I would say this. If  20 evolutionary — do you have an understanding concerning  21 whether evolutionary biology posits that evolutionary  22 change is purposeless?  23 A Okay. So specifically about is evolutionary change  24 purposeless?  25 Q Yeah,</p>
<p style="text-align: right;">Page 147</p> <p>1 A There are other mechanisms, I mentioned before genetic  2 drift, and so there are always in particular cases a  3 question as to whether this evolutionary pathway was  4 more the result of natural selection or drift, for  5 example. So in any particular case or sort of with  6 regard to those kinds of questions, how predominant is  7 natural selection versus drift, say, in any particular  8 case, then there are all sorts of research questions  9 about that.  10 Q Well, I guess I'm just trying to get a sense for the way  11 in which you use "testable," and just if we apply the  12 concept of natural selection to past species, can the  13 operation of natural selection be tested?  14 A Again, it can be tested in the same way. One can do  15 experiments currently to see how natural selection  16 works, under what circumstances does this happen as  17 opposed to that. Once you have that information about  18 the causal processes, then you can use it as you're  19 trying to draw conclusions about the historical cases.  20 Q But those conclusions are the product of reasoned  21 inferences, am I correct?  22 A In just the same way that the other ones were that we  23 talked about. If C cause causes E, the effect, in this  24 set of circumstance and you go back and you say, yeah, I  25 see those circumstances and I see that this effect</p>	<p style="text-align: right;">Page 149</p> <p>1 A Okay. The answer to that depends upon sort of the scope  2 of the question, the scope of purpose in that case. So  3 if the question is does some particular evolutionary  4 pathway through which some adaptation — within which  5 some adaptation arose, is that adaptation purposeless?  6 I think you'd then say not necessarily. You could say  7 this adaptation has a purpose, it's adapted for doing  8 this.  9 That's how natural selection works, it's selecting  10 things which make the organisms better than their  11 competitors, and typically that means they're better  12 able to do something. So in our system, they're better  13 able to replicate or they're better able to perform a  14 function. In the natural world, the same thing, they're  15 better able to replicate or they're better able to  16 perform some metabolic or other function. And in that  17 sense, you'd say you've identified the biological  18 purpose, because evolutionary theory tells you in a  19 natural, testable sense what that is, it helps them  20 survive and reproduce. So in that sense, you can say  21 here's not purposelessness, but purposefulness. On the  22 other hand, you wouldn't say that's what evolution was  23 for, evolution was for making them do this, it's just  24 that evolution did that. So biologists — oh, let me  25 give you one more example because this is the other one</p>

38 (Pages 146 to 149)

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 150</p> <p>1 that I think is critical here.</p> <p>2 If one is talking about meaning, a purpose in life,</p> <p>3 the meaninglessness or purposefulness of life, a</p> <p>4 metaphysical sense of purpose, that's another sense. If</p> <p>5 one religiously thinks God had a purpose for existence,</p> <p>6 a purpose for the world, is evolution purposeful or</p> <p>7 purposeless, in that sense, that's a really different</p> <p>8 kind of question.</p> <p>9 So to answer the question you asked, I'd have to</p> <p>10 say, well, which of those did you mean? The first one</p> <p>11 where I gave the example, I said there's a perfectly</p> <p>12 reasonable sense of purpose, biological purpose, that we</p> <p>13 can test, which we do test. There's another sense,</p> <p>14 though, which we say evolution is for this, we say,</p> <p>15 well, evolution is just purposeless, it just happens,</p> <p>16 these things didn't go along so that we would get big</p> <p>17 brains, this just happened that having big brains was an</p> <p>18 advantage for us. And then the broader question, the</p> <p>19 metaphysical one, is evolution purposeful or</p> <p>20 purposeless, I'd say not testable at all, that's outside</p> <p>21 the range.</p> <p>22 And so when biologists make these claims, really</p> <p>23 they should be asked, well, which of those did you mean.</p> <p>24 And intelligent design and other creationists typically</p> <p>25 conflate those and fault biologists for making claims</p>	<p style="text-align: right;">Page 152</p> <p>1 that former case could possibly happen. There's some</p> <p>2 experimental and theoretical reasons to think that it</p> <p>3 couldn't, but occasionally there are people who still</p> <p>4 put forward this idea of directed evolution. And as I</p> <p>5 say, by that, they simply mean that there's some natural</p> <p>6 mechanism by which the mutations that arise are the ones</p> <p>7 that they need. So it's actually sort of more like</p> <p>8 Lamarck's view than Darwin's view.</p> <p>9 All of the tests that have been done have indicated</p> <p>10 that that view is wrong. It seems as though the</p> <p>11 mutations that happen, the variations that arise aren't</p> <p>12 directional in that sense, they're more the scattershot</p> <p>13 sense. So when biologists say evolution is undirected,</p> <p>14 what they mean, or what they ought to mean, is Darwin</p> <p>15 was right with regard to how variations are produced.</p> <p>16 There's this other notion of being directed, which</p> <p>17 is to say someone is pulling the strings, guiding</p> <p>18 evolution, like a person is doing it, perhaps even a</p> <p>19 supernatural power or being, and that's not something</p> <p>20 that science can pronounce upon. And so when evolution</p> <p>21 is described as a purposeless, undirected process, it's</p> <p>22 easy to confuse these two different notions and make it</p> <p>23 sound as though — or people could easily interpret it</p> <p>24 as science saying I'm telling you there isn't any</p> <p>25 ultimate purpose, there isn't any ultimate someone who</p>
<p style="text-align: right;">Page 151</p> <p>1 about ultimate purpose when they may just be talking</p> <p>2 about a very simple notion and say, well, evolution</p> <p>3 isn't for this, it just happens randomly and natural</p> <p>4 selection happens, and if they're just limiting</p> <p>5 themselves to that process and not making a more general</p> <p>6 claim about whether that process itself has a purpose,</p> <p>7 then they're fine. But it's very easy to slide from one</p> <p>8 to the other.</p> <p>9 Q And let me ask you --</p> <p>10 A Sometimes scientists are at fault for doing this to</p> <p>11 themselves.</p> <p>12 Q With respect to whether evolutionary processes are</p> <p>13 undirected, does the same dynamic apply?</p> <p>14 A Within the field, there's actually been a question of</p> <p>15 something that they've used that term for, "directed</p> <p>16 evolution." And within the field, the answer is no,</p> <p>17 evolution is undirected. What does that mean, what was</p> <p>18 the question? The question had to do with whether in an</p> <p>19 evolving system the variations that arose were those</p> <p>20 variations that the population needed in that particular</p> <p>21 environment so that they're directional in the useful</p> <p>22 way or whether the variations that arose were just on</p> <p>23 scattershot and in the ordinary sense those that</p> <p>24 happened to do better were the ones that superselected.</p> <p>25 So there's some interesting questions as to whether</p>	<p style="text-align: right;">Page 153</p> <p>1 set this in motion. And if that's what was being</p> <p>2 intended, then science can't say that.</p> <p>3 So this actually goes back to our earlier</p> <p>4 discussion about knowing something about the motives and</p> <p>5 affiliations, this goes on both sides. One could find</p> <p>6 with regard to a scientist that their motives and such</p> <p>7 indicate that they're actually speaking in this</p> <p>8 metaphysical way, in which case you'd say, look, that's</p> <p>9 not science, you can't go there, whereas if they're</p> <p>10 being careful, they really should just be sticking to</p> <p>11 the scientific notion and leave it at that and say this</p> <p>12 other question of ultimate purpose or ultimate</p> <p>13 direction, that's not science.</p> <p>14 Q Now, in the example you just gave me, you can tell</p> <p>15 because the speaker has moved beyond the claim that can</p> <p>16 be bounded by methodological naturalism into something</p> <p>17 that's sort of metaphysical extrapolation, is that</p> <p>18 accurate?</p> <p>19 A I wouldn't put it in that way in saying that this is a</p> <p>20 metaphysical extrapolation because I don't think this is</p> <p>21 something that's an implication of the view. The point</p> <p>22 would be is someone building that content into the</p> <p>23 claim. And if they are, then you should say that's not</p> <p>24 science.</p> <p>25 Q Okay And just to understand, when you say building it</p>

39 (Pages 150 to 153)

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 154</p> <p>1 in, you mean what?</p> <p>2 A That it's not an implication or an inference, but it's</p> <p>3 something that they're assuming. That's part of their</p> <p>4 content.</p> <p>5 Q And by that, do you mean it's not a scientific inference</p> <p>6 or conclusion?</p> <p>7 A Correct. Simply by being supernatural, metaphysical, as</p> <p>8 we've discussed before, I'd say that that's taking us</p> <p>9 outside the realm of science.</p> <p>10 MR. GILLEN: Last question.</p> <p>11 MR. SCHMIDT: Do you want to take five minutes and</p> <p>12 get your notes together?</p> <p>13 MR. GILLEN: Maybe, if you don't mind, Tom.</p> <p>14 (Short recess.)</p> <p>15 BY MR. GILLEN:</p> <p>16 Q Are you ready, Dr. Pennock?</p> <p>17 A Yeah.</p> <p>18 Q I want to ask you a few other questions about your</p> <p>19 report here and it's sort of from the historical</p> <p>20 perspective here.</p> <p>21 You have indicated that the commitment to</p> <p>22 methodological naturalism is a hallmark of science, is</p> <p>23 that correct?</p> <p>24 MR. SCHMIDT: I think you asked him that before and</p> <p>25 he gave not an unequivocal yes, I think he explained</p>	<p style="text-align: right;">Page 156</p> <p>1 it is the case that in one particular place that gets</p> <p>2 regularly cited in the Principia, he points to something</p> <p>3 he just thinks he can't explain and says, well, maybe</p> <p>4 God did that. Why don't the planets fall into the sun?</p> <p>5 Well, people talk about this as his gesturing, he says,</p> <p>6 well, maybe God nudged them into the right places, so</p> <p>7 that didn't happen. So in that sense, you'd say, well,</p> <p>8 didn't Newton depart from methodological naturalism in</p> <p>9 that sense?</p> <p>10 And my point to that example, as I've pointed to</p> <p>11 examples of attribution of demonic possession as the</p> <p>12 explanation for illnesses or hexing as the example for</p> <p>13 explanation of sickness of cows and so on as cases in</p> <p>14 which in a much earlier era, people did appeal to</p> <p>15 supernatural forces and powers, but that as we in</p> <p>16 science now, we wouldn't recognize or allow that, that</p> <p>17 our understanding of the process now is such that we'd</p> <p>18 say they just weren't doing science then.</p> <p>19 Now, it sounds funny to say that of Newton because,</p> <p>20 of course, Newton did do work that we now think, of</p> <p>21 course, as scientific, but I think scientists would</p> <p>22 shake their heads at the point where he diverged from</p> <p>23 that. And it's actually interesting, because that's</p> <p>24 really sort of an odd passage in the Principia that</p> <p>25 really he very consistently appeals to causes, he</p>
<p style="text-align: right;">Page 155</p> <p>1 why.</p> <p>2 BY MR. GILLEN:</p> <p>3 Q Is that true?</p> <p>4 A I did give that long answer before to which I perhaps</p> <p>5 can refer?</p> <p>6 Q Well, I guess what I'm -- let me ask the question a</p> <p>7 different way.</p> <p>8 Isn't it true that science has also been conducted</p> <p>9 in a way that did not entail a commitment to</p> <p>10 methodological naturalism?</p> <p>11 A That didn't entail a commitment or didn't involve a</p> <p>12 commitment?</p> <p>13 Q Didn't involve, I guess you could say.</p> <p>14 MR. SCHMIDT: I would object to the form of the</p> <p>15 question. Do you have an example you can give him?</p> <p>16 MR. GILLEN: I guess... ..</p> <p>17 BY MR. GILLEN:</p> <p>18 Q For example, Newton and his laws of gravity, was Newton</p> <p>19 committed to methodological naturalism?</p> <p>20 A I actually do use Newton as an example in my report in</p> <p>21 talking about this. And Newton is an interesting figure</p> <p>22 in that his primary research interest was in biblical</p> <p>23 acts of Jesus, he did more work on that than science,</p> <p>24 but what we look at today in his work are his laws of</p> <p>25 planetary motion, gravitational theory and so on. And</p>	<p style="text-align: right;">Page 157</p> <p>1 actually says we're looking for vera causa, we're</p> <p>2 looking for the true causes of things, he has just an</p> <p>3 ordinary sort of observational evidence, the kinds of</p> <p>4 things that we look at today, he did experiments, all</p> <p>5 those sorts of things are there, and this odd spot</p> <p>6 really is an anomaly in that. And if you look at what</p> <p>7 he says with regard to his methodology, he actually says</p> <p>8 we shouldn't posit hypotheses that aren't sufficient to</p> <p>9 explain the effects that we see.</p> <p>10 So essentially, even in his own methodological</p> <p>11 reasoning, he really is being a methodological</p> <p>12 naturalist, it's just that he's not -- hasn't fully</p> <p>13 absorbed it and there are a few cases where he sort of</p> <p>14 slips. And what should one say about that? Was he a</p> <p>15 scientist or not? Well, of course we call him a</p> <p>16 scientist, but I think what we would now properly say is</p> <p>17 in those cases where he says, well, God did it, I can't</p> <p>18 quite figure this out, that in that sense, we'd say he's</p> <p>19 departed from what we take science to be.</p> <p>20 Q And again, I'm just trying to understand the necessity</p> <p>21 of this commitment.</p> <p>22 Wasn't his effort to determine the laws that</p> <p>23 governed the planets and planetary motion part of an</p> <p>24 effort to detect design, didn't -- wasn't that how he</p> <p>25 conceived his inquiry?</p>

40 (Pages 154 to 157)



ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 158</p> <p>1 A Are there some passages where that's --</p> <p>2 Q I'm just asking you, do you understand him to have been</p> <p>3 trying to determine the design of planetary motion which</p> <p>4 he attributed to a creator?</p> <p>5 A So I'm not a Newton specialist, but I did actually take</p> <p>6 a -- sit in on a full graduate seminar by a Newton</p> <p>7 specialist in graduate school and we went through the</p> <p>8 whole Principia, and that's a good number of years ago</p> <p>9 now, but I don't recall any case that indicates that</p> <p>10 that was his goal. It was certainly his goal as a</p> <p>11 believer to investigate the world that he takes God to</p> <p>12 have created. But I don't think that his goal as I</p> <p>13 remember seeing this was to detect design, it was to</p> <p>14 understand creation.</p> <p>15 He did seek to get some religious understanding</p> <p>16 through his work on biblical acts of Jesus and he spent</p> <p>17 a lot of time on the Book of Revelation and what the</p> <p>18 number of the beast is, but he also spent a lot of time</p> <p>19 trying to say that the physical world view that he was</p> <p>20 promoting, which is physical, he's talking about matter</p> <p>21 and its motions, atoms and so on, that had been</p> <p>22 something that others at the period took to be</p> <p>23 non-Christian, to be sort of blasphemy, and he tries to</p> <p>24 say no, it's wrong of Christians to think in that way</p> <p>25 and he tries to actually connect atomism to Moses, I</p>	<p style="text-align: right;">Page 160</p> <p>1 developed -- is Copernican theory, heliocentric theory,</p> <p>2 a scientific theory?</p> <p>3 A Copernicus himself was working to discover the laws of</p> <p>4 planetary motion, trying to figure that out. He gets a</p> <p>5 certain way with that. He doesn't figure it all out.</p> <p>6 Kepler comes along later, he's the one who actually</p> <p>7 figures out the laws of elliptical orbits and so on, and</p> <p>8 it's not then really until Newton that you wind up</p> <p>9 getting sort of the causal gravitational forces that</p> <p>10 lead to this.</p> <p>11 Copernicus gets it right with regard to sort of a</p> <p>12 gross feature, the sun is more at the center than the</p> <p>13 earth is. He also had what one might think of as</p> <p>14 religious ways of thinking about this, it's not improper</p> <p>15 from a Christian point of view to think of the sun as</p> <p>16 being at the center, because people at the time thought</p> <p>17 that that was non-biblical, that it was crucially</p> <p>18 non-Christian, and they took that as being heretical,</p> <p>19 and this would undermine the whole faith. If you think</p> <p>20 that the earth can move, the Christian entity is out the</p> <p>21 window because it calls everything -- well, that didn't</p> <p>22 happen, of course.</p> <p>23 But the arguments that Kepler gives, the ones that</p> <p>24 we point to as being scientific, are ones related to his</p> <p>25 observations, his trying to make sense of this in the</p>
<p style="text-align: right;">Page 159</p> <p>1 mean, it's sort of a very interesting thing that he</p> <p>2 does, but to try to give a biblical root as a way of</p> <p>3 trying to say, oh, no, this isn't necessarily</p> <p>4 anti-Christian. Because at the time you had the same,</p> <p>5 at least for some people, view that physics called</p> <p>6 Christianity into question.</p> <p>7 Nowadays, I don't think there's anyone who worries</p> <p>8 about that, even the most basic fundamentalist doesn't</p> <p>9 think that that kind of physics, that accepting the</p> <p>10 existence of atoms and so on calls that into question.</p> <p>11 Now they worry about evolution. Previously they worried</p> <p>12 about the shape of the earth, is it flat or not, they</p> <p>13 thought that called them into question. There are a</p> <p>14 whole bunch of things. I think the same thing is true</p> <p>15 now.</p> <p>16 Q I guess what I'm trying to get at is aren't there.....</p> <p>17 scientific theories that have been discovered during the</p> <p>18 historical period when science wasn't characterized by a</p> <p>19 commitment to methodological naturalism?</p> <p>20 MR. SCHMIDT: I object again to the form and ask if</p> <p>21 you can point him to anything in particular.</p> <p>22 BY MR. GILLEN:</p> <p>23 Q Can you answer that?</p> <p>24 A That's what I was just about to ask.</p> <p>25 Q I mean, for example, Copernican theory, wasn't that</p>	<p style="text-align: right;">Page 161</p> <p>1 causal terms that he understands. He gets a lot of that</p> <p>2 wrong, he doesn't understand how things can be</p> <p>3 elliptical, he's still trying to work with circular</p> <p>4 orbits and he still has epicycles of his own. So I</p> <p>5 think you'd have to go through in just the same way and</p> <p>6 look at specific things that he said, and I think from</p> <p>7 our perspective, we'd say some of those things were</p> <p>8 scientific, some of them weren't.</p> <p>9 Q Let me see if I can understand it this way. In page 23</p> <p>10 of your report, the first full paragraph begins with the</p> <p>11 observation "Again, the point here is that the</p> <p>12 scientific methodological principle of restricting</p> <p>13 appeals to natural causal --"</p> <p>14 A I'm sorry, I was writing something. What's the page</p> <p>15 number?</p> <p>16 Q Certainly. It's page 23.</p> <p>17 A Yes.</p> <p>18 Q That paragraph beginning on that page where you say</p> <p>19 "Again, the point here," and you conclude "is perfectly</p> <p>20 reasonable," and I guess my question to you is do you</p> <p>21 have an opinion concerning whether it's unreasonable to</p> <p>22 open science to the possibility of at least what at this</p> <p>23 time would be regarded as supernatural causation?</p> <p>24 A So the rest of that paragraph, I think, does give my</p> <p>25 answer to that in the sense that yes, that would be</p>

41 (Pages 158 to 161)

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 162</p> <p>1 unreasonable because it would seem that in so doing,  2 you're actually undermining the notion of an empirical  3 test. By opening the door, by allowing appeal to  4 supernatural, you wind up thereby removing the ability  5 to make a distinguishing, an empirical test of a  6 hypothesis. So I think it winds up being something that  7 really does in an unreasonable way, the way you asked  8 the question, in an unreasonable way change the basis  9 for acquiring empirical knowledge.</p> <p>10 Is it unreasonable from a spiritual point of view  11 or religious point of view to consider the possibility  12 of supernatural? I would not say it's unreasonable in  13 that sense. There could be religious reasons, spiritual  14 reasons that one might have to think that that's an  15 important possibility to consider. But I take it that's  16 not your question. I don't mean to sort of deny the  17 rationality of someone who might consider that from a  18 religious point of view. I am saying I think that's  19 unreasonable from a scientific point of view.</p> <p>20 Q Do you have an opinion concerning whether supernatural  21 causation could ever be empirically proven to exist?</p> <p>22 MR. SCHMIDT: Didn't we already do this this  23 morning?</p> <p>24 MR. GILLEN: I don't think so.</p> <p>25 MR. SCHMIDT: I thought so. I'll trust</p>	<p style="text-align: right;">Page 164</p> <p>1 A So this is something where in my book, Tower of Babel, I  2 say science, the philosophy of science, isn't saying  3 that the supernatural doesn't exist by fiat, just  4 rejecting it, this is a methodological point, and in  5 principle, one has to leave open the possibility that  6 some day someone could figure out a way to do this,  7 simply because one always philosophically considers  8 conceptual possibilities, says, well, you know, I can't  9 see now a logical reason that it couldn't happen and so  10 maybe conceptually someone could do it, my point here is  11 I can't imagine what that would be like. I'd sort of  12 say, well, if someone could do it, great, that would be  13 an amazing methodological advance, and so in that really  14 hypothetical kind of case, one saying yeah, it could  15 happen.</p> <p>16 But one has to look at a suggestion. If someone  17 were to be able to do that, we'd want to look at it and  18 say, well, how are you going to do it? That would be  19 really interesting. And I can't imagine how someone  20 could do that. I'm open to the possibility that someone  21 could, but I'm skeptical that it will happen, I think  22 that will always remain in the realm of faith.</p> <p>23 Q And I take it you don't believe that intelligent design  24 theorists have done that?</p> <p>25 A I don't think they've come close to doing that.</p>
<p style="text-align: right;">Page 163</p> <p>1 Dr. Pennock's recollection of it.</p> <p>2 A Yeah, I thought we touched on that with regard to the  3 discussion of occult properties and gravity.</p> <p>4 BY MR. GILLEN:</p> <p>5 Q Well, what was --</p> <p>6 A So if there's a different --</p> <p>7 Q I don't know --</p> <p>8 A -- question than my answer to that, maybe you could  9 rephrase it.</p> <p>10 Q Well, can science test for supernatural causation?</p> <p>11 A So again, I believe that I answered that previously in  12 saying that something that we might have taken to be  13 supernatural, an occult property, might be discovered  14 not to be, and in that sense, we've tested it and found  15 that it's part of the natural world. But that's not to  16 say that we've really tested supernatural and confirmed  17 it, it's that what we've done is learned something more  18 about the natural world, it's now part of just the  19 ordinary causal structure, we learned about it in just  20 the same sort of way.</p> <p>21 If we're talking about the supernatural in the way  22 that we've discussed it before and the question is is it  23 sort of conceivable that there's a way to prove that it  24 exists, is that the way you asked the question?</p> <p>25 Q Yes. Or test whether it exists.</p>	<p style="text-align: right;">Page 165</p> <p>1 Q And finally, so much of today's discussion has been  2 focused on methodological naturalism, and I just want to  3 ask, it seems to me as a layman that the commitment to  4 methodological naturalism is itself a sort of a priori  5 commitment that the scientist makes his own when he  6 engages in science, is that accurate?</p> <p>7 A Is methodological naturalism itself a what?</p> <p>8 Q A priori commitment, a sort of fundamental beginning  9 commitment that the scientist in order to see himself as  10 engaged in science as you understand it makes?</p> <p>11 A So the term "a priori" is another term where one has to  12 be careful about its meaning, so let me just be clear as  13 to how you're --</p> <p>14 Q Okay.</p> <p>15 A So am I claiming that this is -- that methodological  16 naturalism is the result of a priori reasoning? What's  17 a priori reasoning? Philosophically, that's something  18 that is reasoning that's done independently of empirical  19 fact. So an a priori conclusion is one that one gets  20 simply by virtue of logic or structure of grammar or  21 something of that, and to find out whether it's true or  22 not, you don't have to look at the world. A posteriori  23 reasoning will require that you check the world somehow  24 to see whether it's right.</p> <p>25 Is my claim that this is just something that mere</p>

42 (Pages 162 to 165)

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<p style="text-align: right;">Page 166</p> <p>1 abstract reasoning says is a commitment? I'd say no. I  2 think, actually, you can give rational reasons as to why  3 you ought to hold this, but those reasons are not  4 entirely a priori, they also involve empirical elements  5 and so on. And in claiming that methodological  6 naturalism is part of what we understand science to be,  7 in part I'm just wanting to, what we know about  8 scientists, explicating the scientific process, so it  9 goes back to what we were talking about before.  10 It also involves reasons, so in my book I tried to  11 cite here's why this is a rational constraint for the  12 type of process that we're engaging in, which is to say,  13 empirical research with these ends in mind for this type  14 of knowledge. It's not to say that there might not be  15 other kinds of knowledge, but with regard to empirical  16 knowledge, this is actually a constraint that's crucial.  17 And if you're going to depart from it, you're going to  18 have to make a really radical shift, and there ought to  19 be sound, strong reasons for doing so, you've really got  20 to show here's how it could work, here's how a theistic  21 science, here's how a science that includes the  22 supernatural could really work.  23 From the arguments that I've given you, from what  24 I've seen, I'm not alone in this, it's pretty standard,  25 it's hard to imagine how that could get even get off the</p>	<p style="text-align: right;">Page 168</p> <p>1 such that one then would test, it's offering a  2 procedure, saying here's how to go about things.  3 So I would say it doesn't even make sense to say  4 that it's something that could be confirmed  5 scientifically in the sense that it's not making a  6 scientific claim of that sort, it simply is part of what  7 scientific method is -- scientific investigation is  8 about.  9 Q Is it fair to characterize it as a convention of the  10 scientific community?  11 A So here the term I would sort of ask about has to do  12 with convention. And in one sense of the term, to say  13 that something is conventional is just to say, you know,  14 it's fashion, it's the convention of the day, the  15 fashion of the day and so on. And in that sense, I  16 would say no, it's not just fashion, it's not something  17 where we're going to just change one's clothes and still  18 say that you're doing science.  19 In a more technical sense of a convention, say this  20 is the standard of the profession, and in that sense, I  21 think you'd say yes, that this is part of the standard  22 of the profession and that we judge whether something  23 counts as science or not in part on this basis. Which  24 is why even looking historically, we have this, I think,  25 pretty straightforward way in which we'd say, look, even</p>
<p style="text-align: right;">Page 167</p> <p>1 ground. As I said, I looked through the scientific  2 literature to see if there's any sense of people  3 starting to consider supernatural. You don't see it  4 there. I found this -- this single case of this person  5 from alternative medicine, and even he says, you know,  6 if you accept that, it's not scientific. There just  7 doesn't seem to be a way. A philosopher might say but  8 we can still think about this, this conceptual  9 possibility, I mean, there are metaphysicians who spend  10 their lives arguing about metaphysics, but that doesn't  11 apply to this kind of case. So the claim that I'm  12 making really is in that spirit.  13 Q Okay. And I'm just trying to get a sense, that  14 commitment to methodological naturalism can't be, what  15 should I say, confirmed to be true scientifically, can  16 it?  17 MR. SCHMIDT: Object to the form.  18 A So as we said at the beginning, methodological  19 naturalism itself is a method, it's a way of proceeding,  20 and as such, it's not something that one investigates  21 scientifically because it is the very process itself,  22 that is, how one goes about scientifically proceeding.  23 This is just a matter of saying what are the procedures  24 that are followed. Methodological naturalism isn't  25 making a claim, an empirical claim the world is such and</p>	<p style="text-align: right;">Page 169</p> <p>1 though Newton was a scientist, no, he wasn't behaving  2 scientifically when he did that, called upon God to keep  3 the planets from falling into the sun. So that's the  4 sense in which I'd say acceptable as a convention.  5 Q That's a good question.  6 At the time Newton made his discoveries, was this  7 convention part of science?  8 A So as we discussed before, I think this is one of those  9 examples where you say Newton is a transitional figure.  10 What we understand now to be modern science wasn't fully  11 in place at that point, and so there are elements of  12 Newton's thinking that we would judge now to be  13 scientific in our sense of the term and other parts of  14 his thinking that we would judge to be outside what we  15 take to be science.  16 MR. GILLEN: I have no further questions.  17 (Deposition concluded at 5:36 p.m.)  18 * * *  19  20  21  22  23  24  25</p>

43 (Pages 166 to 169)

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

Page 170

## SIGNATURE PAGE

ROBERT T. PENNOCK

Subscribed and sworn to before me this

\_\_\_\_\_ day of \_\_\_\_\_, 2005

Notary Public, \_\_\_\_\_ County, Michigan

My Commission Expires: \_\_\_\_\_

Page 171

State of Michigan )

County of Oakland )

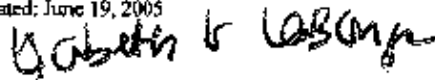
## Certificate of Notary Public - Court Reporter

I do hereby certify that the witness, whose attached testimony was taken in the above-entitled matter, was first duly sworn to tell the truth; the testimony contained herein was reduced to writing in the presence of the witness by means of stenography; afterwards transcribed; and is a true and complete transcript of the testimony given by the witness.

I further certify that I am not connected by blood or marriage with any of the parties; their attorneys or agents; and that I am not interested, directly or indirectly, in the matter of controversy.

In witness whereof, I have hereunto set my hand at Troy, Michigan, County of Oakland, State of Michigan.

Dated: June 19, 2005



Elizabeth G. LaBerge, CSR-4467

Certified Shorthand Reporter

Notary Public, Wayne County, Michigan

44 (Pages 170 to 171)



ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

<b>A</b>				
abilities 120:6	129:24 130:16,22	116:16 129:7	admit 131:13	121:10 124:15,24
ability 27:20 30:5,6	130:22 132:4,11	acknowledgment	advance 37:13	agents 171:14
30:8 31:2 36:6	134:20 135:1,7,12	49:11 123:3	103:3 119:1,10	ago 43:14 132:8
38:17,22 84:3,5	136:9,13,17	124:12	121:3 164:13	158:8
84:15,18 113:13	137:15,18 138:20	acquire 30:9	advanced 135:17	agree 33:8 135:17
126:25 162:4	138:23 139:6,24	acquired 137:18	advantage 150:18	agreed 4:15 110:12
able 86:21 102:15	140:9,10,12 141:3	acquiring 162:9	advantageous 37:15	agreement 48:11
104:6 121:24	141:19,22 142:8	acting 55:16	advice 42:25	agrees 123:8
130:3 144:1,3	143:16,22 144:14	action 42:3 79:12,17	advisory 41:7 43:7	ahead 35:25 79:9
149:12,13,13,15	145:18,19,24	83:18	advocate 90:19	123:12 146:25
149:15 164:17	146:13,19,22	actions 55:22 56:3	advocates 69:4,5,5,6	aim 96:11
about 4:19 7:3 11:1	147:9,17,19,23	activists 44:14	69:7 123:20	aims 85:16
11:17 13:8 17:7	148:4,17,23 150:2	acts 155:23 158:16	advocating 54:4	allow 26:18 29:15
20:18 22:7,18	151:1,2,6 153:4,4	actual 23:15	113:16	31:3 65:15 93:1
29:17 32:16 33:3	154:18 155:21	actually 18:3,4 19:2	affairs 39:23 40:4	106:10 122:18
33:21 38:23 40:12	156:5 157:14	19:16 20:5,5	affect 28:4,5,16	156:16
41:1 42:6,17	158:20 159:8,11	26:14,16 29:2	affected 57:11	allowed 24:13
43:14 44:5 45:4,5	159:12,24 160:14	45:15 59:20 65:5	affiliations 57:20	allowing 162:3
45:6,21,25 48:10	163:18,19,21	65:6 67:16 79:23	58:4,21,24 59:11	allows 65:8,16
50:6,13 51:23	165:12 166:7,9	79:24 84:10 87:4	60:18,24 61:7,9	74:16
54:4 55:1,9,14	167:8,10,22 168:2	88:16 91:19 99:12	153:5	alluded 49:20
58:8,9,15,17	168:8,11	102:15 108:23	affirm 70:20 72:1	almost 78:21
59:18,21 60:1,23	above 78:4,5,11	114:9,11 117:8,22	affirmed 4:6	alone 166:24
62:6,10,11,17	above-entitled	120:7,21 127:22	after 15:25 66:6	along 150:16 160:6
63:1,16,17 64:2	171:6	132:5,10,17	79:4	already 55:23
64:23,24 65:1,10	absolute 144:21,23	135:14 141:14	afterwards 171:9	118:17 126:12
65:12,13,18,22	absorbed 79:4	142:2,3 151:14	again 5:18 7:2 10:7	130:6 162:22
66:2 67:16,18	157:13	152:7 153:3,7	11:24 13:22 14:3	alternative 11:15
68:15,19 72:17	abstract 166:1	155:20 156:23	14:20 19:1 20:8	44:18,18,20
73:8 74:14,17	accept 167:6	157:1,7 158:5,25	21:16 24:15 26:8	109:18,19 111:21
75:8 77:17 79:10	acceptable 112:15	160:6 162:2 166:2	27:2 28:13 29:21	113:16 115:15
79:21 82:22 83:23	169:4	166:16	31:16 36:2 42:19	167:5
84:6,21 86:21	accepting 159:9	adaptation 149:4,5	50:12 51:13 56:6	although 96:12
87:20 89:2,11,21	accepts 76:10 77:13	149:5,7	56:16 57:18 59:3	138:22
90:13,18,23 91:11	access 82:21 100:17	adaptations 67:12	59:4,23 62:4,8,14	altruistic 127:1
91:20 92:2,15,17	accessible 70:22	adapted 149:7	62:25 64:8 65:25	always 43:3 47:10
92:22 94:23 96:7	87:8	add 29:10	71:23 72:2,19,20	50:15 55:15 75:3
96:18 97:3,3,4	According 88:15	added 28:24	76:5 80:11 82:10	88:25 96:22 97:10
100:12 103:11	account 7:7,9,10,11	additional 13:25	83:6 87:9 88:13	99:2,15 102:17
105:15 107:19	7:16,21 8:18,25	15:20 61:2 70:11	89:6 93:12 94:3	133:6,7,17 134:7
108:16,19,23	9:8 12:22,22,24	119:10,24 121:16	94:16 95:11 96:11	135:10 145:6,22
109:5 111:1,13,20	13:3,14 14:6 15:5	address 6:8,14	96:12 98:8 101:13	147:2 164:7,22
112:22,23,25	36:25 44:18 74:6	137:7	103:22 105:5	amazing 164:13
113:5,19 116:10	76:2,11,25 77:2	addresses 137:11	106:3,4,7,16	ambiguity 99:22
117:3,12,13,17,19	77:14 111:19	addressing 40:2	107:7 111:3	137:4 144:15
117:23 118:1,3,6	135:15	adequate 119:15	112:16 113:23	ambiguous 98:24
118:8,9,16,19,22	accounted 28:1	adhere 70:8	115:1 119:19	129:20 130:7
118:23 119:10,16	accounts 7:19	adherence 69:25	129:21 131:16	Americans 43:8
119:24 120:5,7,18	135:12	adherents 11:4	134:11 136:20	amino 29:22
120:20 121:6,9,13	accurate 14:2 19:25	46:24 47:6 48:20	138:19 139:16	among 37:7 47:14
121:15,18,21,21	27:24 128:24	adjunct 18:2,2	145:6 147:14	67:2 87:14 114:21
121:25 122:6,17	134:18,23 136:6	adjust 27:23	157:20 159:20	137:19
122:21 123:14,17	145:16 153:18	administration	161:11,19 163:11	amorphous 46:10
123:19,24 124:4,7	165:6	42:20	agent 116:13 117:1	analysis 7:10,13
126:15 129:8,23	acids 29:22	administrators	117:2,4 119:2,4	11:19 14:5 15:4
	acknowledging	41:24 42:4,11	119:11,16,24	49:8 103:4

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

2

analyze 86:8	105:8,8 106:10	86:22 91:12,20	attributes 74:13	60:19
ancestor 67:1,15	107:20 156:14	132:14 150:9,23	75:20 89:16,21	bears 7:25
ancient 121:25	162:3	154:24 162:7	90:2,10,15 91:21	beast 158:18
animals 37:10	appealing 142:7	163:24	116:24 117:1,3,18	became 79:3
Ann 2:13	appeals 156:25	asking 6:5 26:21	118:1,17 121:9	become 51:2,10,17
anomaly 157:6	161:13	33:21 52:25 53:16	123:18	becomes 79:24
another 10:8 27:4,6	appear 4:16 70:5	60:3 63:10 81:24	attribution 156:11	98:23
27:8 36:7 48:1	71:18	81:25 97:3 108:15	Austin 16:2,5	becoming 6:21
67:13 72:17,18	APPEARANCES	116:25 117:5	authors 116:23	before 5:17,19
90:19 98:25 99:17	2:1	123:6,9 124:7	119:1 123:7	18:16 21:18 22:8
103:1,17 104:7	Appearing 2:8,15	125:3 158:2	124:21	58:7,14 63:1 68:1
117:23,24 118:7	appears 52:22	asks 10:16 109:12	automatic 38:20	80:3,4 83:8 84:9
121:21 125:12	129:20 140:24	aspect 26:19	available 4:17	84:21 91:12 92:15
127:12,13,20	148:5	aspects 133:22	146:12	92:24 93:6,22
128:4 137:13,20	applied 146:14	assembly 31:11	AVIDA 23:12	100:13 107:8,19
150:4,13 165:11	apply 56:18 147:11	asserted 72:20	aware 68:21 126:6	109:5 125:13,19
answer 5:4,5,15,19	151:13 167:11	assertion 123:10	126:11	129:24 132:4
15:2 16:19 36:23	appreciate 5:7	assertions 72:12	A-V-I-D-A 23:12	135:1 136:11
45:10 50:16 53:14	49:10	126:9	a.m. 120:4,3	137:4,15 138:20
53:25 60:9 63:20	appreciated 144:7	assessment 49:6		138:21 139:9
75:17 82:15 91:20	approach 7:4 14:22	112:11	B	141:3 143:9,16
100:5 102:6 106:1	72:2 98:23 111:16	assigning 102:25	B 1:7 2:3 3:11 4:5	146:19 147:1
107:9 108:1	appropriate 50:5	assignment 133:7	Babel 164:1	154:8,24 155:4
109:13 116:14	approximate 23:10	Assistant 16:6,8	back 14:24 15:8	163:22 166:9
117:3,6 121:20	approximation	assisting 42:16	18:19,21 19:2	169:8 170:18
123:3,13 124:25	23:15	associate 6:19 16:10	20:8 26:9 30:17	begin 13:10 53:13
126:25 127:11	ARALENE 1:7	18:4 46:18 73:20	33:17 35:16 59:9	beginning 46:7
129:8,11,18 130:3	Arbor 2:13	73:20	62:4 64:24 84:20	96:17 101:16
130:6,15 134:1,3	archaeological 120:4	associated 12:8	90:4 123:1 131:2	126:4 132:14
134:6,7 143:7	121:23	120:20	136:20 147:24	161:18 165:8
149:1 150:9	archeologist 117:15	association 18:7	153:3 166:9	167:18
151:16 155:4	archeologists 118:5	73:25	background 9:6	begins 98:4 101:11
159:23 161:25	archeology 117:14	associations 38:24	backing 90:25	136:2 161:10
163:8	120:1 122:24	assume 43:21	BARRIE 1:7	behalf 2:8,15
answered 63:13	area 1:12,12 6:8	113:12	base 49:5	behaving 169:1
76:22 115:12	139:10 140:7	assuming 154:3	based 47:8 51:10	behavior 17:12
130:9 163:11	argued 89:5	assumption 54:25	55:6 57:7 64:5	127:2
answering 5:18	arguing 167:10	96:10 114:16	74:20 111:23	behaviors 55:23
answers 12:14 36:1	argument 85:10	115:2	119:8 120:4	56:3
85:2 130:14	88:7 89:10 91:16	assumptions 14:16	124:21	Behe 11:22 12:3
antelopes 37:12	99:1,18	15:2 86:2 109:7	basic 24:16 31:10	20:22 21:6 33:3,7
anti-Christian	arguments 160:23	114:8 121:12	70:10 71:18 76:24	33:24 34:19 45:17
159:4	166:23	astronomer 86:16	81:25 93:2,19	87:20 88:3,19,20
anyone 41:2 55:20	arise 81:15,17 152:6	atheism 62:19	95:14 98:18 102:8	90:13,22 108:10
96:14 159:7	152:11	atheistic 62:12,16	103:10 107:20	108:13 109:24
anyone's 55:15	arising 25:20 37:8	atomism 158:25	110:3 114:16,16	110:1,5,23 111:7
anything 11:22 12:4	arose 137:25 149:5	atoms 158:21	121:12 159:8	111:21 112:2
12:10 19:23 20:12	151:19,22	159:10	basically 19:17	114:19 115:14
20:24 21:8,14,20	around 15:7 92:21	attached 171:5	126:7	Behe's 32:23 33:1
29:10 52:15 82:22	arrived 29:11	attention 4:23 19:25	basis 18:19 50:22	33:21 34:12,17
89:8 104:21 116:4	art 12:15	99:15,25 125:23	57:14 63:4 73:25	89:5,10 108:12,15
118:1 123:17	articulated 34:15	attorneys 4:14 20:9	88:1 98:13 104:22	109:17 111:16
140:1 146:2	72:19	171:14	110:4 119:15	112:1 113:5
159:21	artificial 23:7 86:20	attraction 64:25	122:1 129:17	being 13:20 37:21
apart 61:8 94:20	aside 133:19	attribute 28:2 80:14	162:8 168:23	50:16,17 54:1
appeal 50:4 93:7	asked 5:21 43:11,15	attributed 158:4	bear 5:14 8:15	58:9,16 62:22

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

3

70:1 72:7,21 74:8 74:11,18 75:15,20 79:16 83:9 91:16 92:6 94:4 97:4 99:16 102:17 104:3 107:8 109:1 109:15 112:15 115:19 117:16,24 117:24 121:21 131:3 152:16,19 153:1,10 154:7 157:11 160:16,18 160:24 162:6 beings 85:17 86:11 93:8 96:20 107:22 118:22 120:5 121:13,19 122:6 122:13,17 belabor 60:8 belief 51:4 52:7 54:5 57:11 62:12 65:18 76:12 77:15 88:1 91:8 93:7 107:22 beliefs 51:12 53:11 55:8 62:16 63:3 64:11 91:7 believe 6:10 11:8 41:4 45:20 51:6 52:3 53:22 56:10 56:13 57:4,4,23 58:4 62:1 66:22 87:19,21 89:14 97:18 101:14 114:20 125:19 144:8 163:11 164:23 believed 142:20 believer 107:12 158:11 believes 54:11 besides 21:14 best 5:11,16,23 bet 127:12,13 BETH 1:6 better 4:20 5:21 6:25 9:3 15:8 26:5 27:4,11,16,17 35:23,24 39:19 44:5 66:3 119:20 149:10,11,12,13 149:15,15 151:24 between 7:18,20,23 8:8 10:9 11:1 22:9 51:15 61:24 71:7 71:11 73:18 77:3 77:8 81:2 85:18	91:5 92:3 100:8 140:22 beyond 18:5 78:3,11 153:15 bias 103:2 biblical 155:22 158:16 159:2 big 140:18 150:16 150:17 Bill 98:12 billion 75:12 biological 23:11 24:23 26:2 29:22 31:15 36:21 56:9 66:19,22 67:10 139:11,13 149:17 150:12 biologist 16:14,24 biologists 39:3,3,4,5 48:18 66:22 139:2 139:19 149:24 150:22,25 152:13 biology 3:17 15:13 15:15,18,19 16:25 17:11,15 23:4 40:10 42:1 48:21 48:23 49:2 58:25 59:12,15,18,21 60:3 62:1,3 70:23 125:22 132:9 137:13 139:15 140:13 144:9 148:21 bit 9:3 38:23 59:25 76:14 120:7,18 138:5 143:14 bizarre 117:25 blasphemy 158:23 blood 171:13 blurred 22:3 board 1:13 21:16,18 22:5 41:7 43:7,12 body 21:10 122:9 book 90:20,20,23 110:11 158:17 164:1 166:10 books 95:19 both 26:21 32:2 36:5 75:12,13 153:5 bottom 126:1,4 128:19 bound 78:22 boundaries 78:15 78:20 139:17 bounded 153:16	brains 150:17,17 Brayton 40:18 break 6:1 31:14 35:5 66:5 103:14 brief 139:1 briefly 7:2 20:5,11 21:7 33:1 bring 14:9 101:6 135:13,15 bringing 61:4 brings 76:3 broad 128:12 134:22 135:8 144:12 broadcast 86:10 broader 82:2 92:25 138:15 140:1 150:18 broadly 45:22 52:10 82:7 138:8 brought 21:11 49:21 BRYAN 1:5 building 62:17,19 153:22,25 built 62:15,23 115:22,22 117:19 117:20 bunch 132:16 159:14 bureaucracy 18:6 bureaucratic 18:4 businessman 40:18 butterflies 137:17 B.A 15:17 B.S 15:15,17	calls 33:4 159:10 160:21 came 7:12,13 16:9 19:16 66:20,23 67:15 138:21 Campbell 20:21 capable 82:23 capacities 27:14 capital 129:5 careful 13:12 153:10 165:12 carefully 63:4 carried 85:25 carrying 126:4 carryover 49:5 case 1:10 5:11 7:22 9:11,13 14:11 17:2 18:18 21:9 21:13 22:8 25:7 25:14 26:2 27:18 29:2,22 31:16 37:6 38:14 40:21 41:2,25 42:14,14 42:18 43:4 45:6 45:12 46:24 54:19 54:21 56:23 57:9 57:17 58:8,18 59:24 62:11,13,15 63:19 64:3 65:17 75:9 78:14 86:5 87:1 88:5 90:17 91:15 94:5 97:20 100:20 101:4 109:13 112:1 117:20 118:14 120:1,4,14,21 127:1 129:5 130:3 131:22 135:9,9,21 140:5 141:11 144:22 147:5,8 149:2 152:1 153:8 156:1 158:9 164:14 167:4,11 cases 32:8,9 34:17 41:17 45:4,7,8,23 45:24 50:18 54:2 54:6,16,17 55:5 58:12 60:5 61:13 62:9 63:15,15,25 64:2 89:22 98:16 98:24 99:7,10 114:5,12 118:6 119:8 120:25 130:4,7 133:8 147:2,19 156:13 157:13,17	case-by-case 63:4 categories 78:14,19 78:21 80:8 81:8 categorization 81:1 categorized 61:8 category 80:9 causa 157:1 causal 7:24,25 23:19,23 33:11 67:10 77:24 78:3 78:11 79:13,25 81:17 82:5,8 83:1 83:3 84:1,10,16 84:23,25 88:11,12 92:18,20 100:18 100:24 101:6,7,24 102:3,7,8 107:1 116:1 118:7 135:2 141:6,7,20,22 142:4,7 143:9,17 147:18 160:9 161:1,13 163:19 causality 105:3 causally 142:11 causal-mechanical 7:7,9,10,15,21 8:18 causation 8:8 107:5 107:17 112:18 113:8 161:23 162:21 163:10 cause 90:2,15 96:24 97:5,11 103:6,7 116:17 120:14 141:13 147:23 148:1,2 causes 103:8 105:9 105:24 121:16 141:10 147:23 156:25 157:2 cause/effect 120:13 caveat 145:22 ceases 31:24 32:1 cell 129:12 center 1:21 2:11 69:23 160:12,16 central 10:13,14 66:24 71:1 72:19 72:21 74:5 94:8 113:12 134:5 145:19 certain 24:9,23,24 29:20 33:3 51:3 51:24 63:15,25 79:2 92:16,16 93:3 100:15
--	---	--	---	---



ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

4

112:16 115:5 119:8,23 142:20 142:20 160:5 certainly 14:20 22:1 57:4 60:16 68:1 72:6 74:22 75:6 128:11 135:24 138:17,22 141:16 144:10 158:10 161:16 certainty 144:21 Certificate 171:3 Certified 171:24 certify 171:5,13 cetera 145:21,21 chair 39:14 challenge 44:16,16 109:2,11 112:4,8 112:12,13 113:2,5 115:11,11,16 chance 4:19 29:4 112:22 116:3 change 24:9,10 26:18 38:2 54:23 55:2,9 94:12 95:13 148:22,23 162:8 168:17 changed 80:9 changes 31:13 38:1 55:6 79:21 changing 25:6,6 56:1 84:7 137:25 characteristic 8:25 70:2 71:15,20,25 93:14,21 94:3 101:15 characteristics 4:23 69:13 111:18 characterizations 107:21 characterize 168:9 characterized 63:12 93:23 159:18 charity 99:24 check 126:10 165:23 checks 71:17 chemical 30:13 31:17 88:23 113:14 116:5 139:14,24 140:3 Christian 73:3 74:19,22,24 90:25 91:4,18,21,23 160:15,20 Christianity 74:21	74:23 91:24 123:23 159:6 Christians 158:24 CHRISTY 1:5 Church 43:8 circular 29:2 161:3 circumstance 103:3 120:13,14 141:10 141:12 147:24 circumstances 51:24 52:1,2,3,15 64:13,17 119:9 121:11 127:2 147:16,25 cite 96:21 97:9 98:15 166:11 cited 156:2 citing 97:3 citizens 40:12 41:1,3 41:5 42:2,3 claim 11:17 33:3 34:21 50:19 64:13 71:15,23 72:25 73:5 80:14 81:2,4 88:19 89:16 91:7 92:12,13,18 97:8 97:16,19 99:24 108:14,23 109:15 109:17 110:3,6 111:11,12,18,21 112:6,8 113:4,16 113:25 114:23,24 116:22 117:2,16 119:1 123:14 124:2 146:6 148:17 151:6 153:15,23 165:25 167:11,25,25 168:6 claiming 11:16 69:15 75:20 111:4 165:15 166:5 claims 49:9 50:23 52:14 58:18 63:7 64:1 69:22 72:7 86:24 90:1,14 92:10,14 94:25 97:17 108:15 111:13,23,24 112:3 114:2,19 117:7 140:14 144:5 150:22,25 clarify 21:24 class 47:7 67:13 classed 132:16 classes 39:20 42:8	classic 79:12 classification 132:18 classified 46:3 50:10 93:1 classify 93:12 classifying 67:19 clear 9:14 14:11 22:11 62:5 64:19 71:4 76:12 95:25 110:1 114:12 137:2 165:12 clearer 115:20 clearly 124:10 client 4:16 6:9 close 31:10 87:1,13 87:15 99:15 164:25 clothes 168:17 coherent 15:4 coin 68:3 75:7 College 16:3,7 colloquial 99:4,4 129:14 131:4 136:23 144:16 145:13 column 142:9 combining 137:20 come 9:5 36:20,20 43:10 83:15 95:1 99:13 129:24 133:7,10,14,17 138:11 146:2 164:25 comes 93:10 96:8 116:8,8 133:6 134:9 160:6 coming 4:20 7:1 15:9 25:6 46:8 84:8,8 comment 61:15 Commission 170:24 commitment 93:13 98:19 154:21 155:9,11,12 157:21 159:19 165:3,5,8,9 166:1 167:14 commitments 75:14 93:3 134:5 committed 155:19 committee 39:12,15 39:16 40:1,6 committees 39:10 common 46:17,20 46:23 47:15 48:14	66:25 69:18 70:5 104:19 144:8,10 144:11,12 145:3 commonly 75:8 communication 5:9 community 13:7 126:22 168:10 comparing 142:14 compatible 76:12 77:15 compete 26:3,24 27:1 30:10 36:19 competing 27:3,7,8 33:14 35:22 competition 25:21 27:2 38:15 competitors 149:11 complaining 42:17 complete 5:17,19 171:10 complex 33:4,7,10 33:16,19,24 34:5 34:10,11,18 88:21 109:10 111:5 113:15 114:10,11 142:6 complexity 12:3,8 12:12 32:24 33:2 33:22 34:13,13 88:7 108:2,5,10 108:13,16,20 111:1,9,19 112:21 113:15,20 114:1 114:20 115:9,20 133:4 complicated 93:24 142:3 component 23:23 components 66:24 67:19 139:14 computer 15:22,23 17:1,8,10,13,13 17:16,21,25 18:7 18:13 22:19,21 23:2,4,24,25 24:1 24:8,20,21,21 25:8 26:10,12 28:16 30:15 31:10 31:22,25 34:9 114:21 115:4 computing 27:13 conceivable 163:23 conceivably 134:8 conceive 4:18 135:9 conceived 157:25 concept 10:18 12:3	12:8 13:2,6,18,21 13:24 14:1,3,17 15:5 33:2,23 34:9 55:25 62:18,22 70:3,10 71:6 96:6 108:2,12,13 111:1 111:10,12 147:12 concepts 10:12,14 10:22 12:20 13:20 13:25 14:12 76:6 137:22 140:10 conceptual 105:14 106:7 164:8 167:8 conceptually 72:6 164:10 concern 43:6 139:21 concerned 136:12 concerning 12:1 95:8 97:15 105:1 123:10 148:7,15 148:20 161:21 162:20 conclude 122:14 161:19 concluded 169:17 conclusion 11:18 49:19 57:13 88:6 99:20 141:19 142:8 144:21 154:6 165:19 conclusions 95:1 117:17,19 121:13 121:18 122:5,19 147:19,20 Concretely 50:9 condition 58:1 conducted 155:8 conferences 139:8 confine 49:8 confirm 104:21 132:22 146:22 confirmation 10:4,6 10:7,10,15,18 11:2,6,12,19 84:21 101:12 134:17 145:15,15 145:18,19 confirmed 10:21 66:18 102:9 106:18 129:13 130:5 131:10,12 131:23 132:25 133:8,9,13,23,25 134:6 142:11 145:20,20 146:16 146:18,24 163:16
--	--	---	--	--



ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

5

167:15 168:4 confirming 101:24 102:3,7 confirms 84:18 conflate 150:25 confuse 120:23 152:22 confused 123:14 125:2 confusion 76:15 Congratulations 6:23 connect 105:5 138:15,18 158:25 connected 50:19,24 60:10 71:19,23 72:2,6 80:22 84:22 85:3 138:23 145:9 171:13 connection 13:20 26:9 58:2 59:19 71:10,11 72:3 connections 49:7 57:23 58:15 62:11 64:12 73:18 139:18 consider 16:13,24 16:25 17:5,8 162:11,15,17 167:3 considered 139:14 considering 81:18 considers 164:7 consist 14:15 40:1 consistency 51:5,11 91:5,11,13 120:11 consistent 6:9 51:3 51:13 88:24,25 96:4 112:25 consistently 93:10 156:25 constellation 135:2 constitute 91:7,14 constrained 98:6 constraining 29:23 constraint 36:8 105:7 166:11,16 constraints 29:25 30:1 107:14 114:17 125:7 consultant 41:24 42:19 consulted 41:24 contacted 42:18 contained 171:7 content 49:18 50:7	50:15 51:25 52:13 53:9,9,10,11,25 54:1,22,24 55:1,6 55:9,25 56:24 57:11 58:10,18 59:17 61:16,21 63:2,6 64:3,13,14 73:4 75:19,24,25 75:25 90:9 153:22 154:4 contest 5:25 context 65:4 continually 130:5 continue 110:18 continues 127:23 128:22 129:20 continuing 130:13 continuity 139:19 contrast 8:20 131:5 131:13 control 101:17 102:12 103:24 controlled 23:8 26:15 101:22 102:13,20,22 141:4 controversy 171:16 convention 168:9,12 168:14,19 169:4,7 conventional 168:13 conversation 5:2,18 64:22 65:10,23 89:9 conversations 89:4 conviction 110:5 Copernican 159:25 160:1 Copernicus 160:3 160:11 copy 44:1 copy/paste 37:23 core 9:11,13 24:20 46:1,3,5,5,22 69:16,20 72:14 134:10 138:19 corpus 7:5 correct 8:13 9:11,21 17:17 18:14,15 20:1 26:13,24,25 27:25 28:8,12 30:21 32:1,24,25 33:9 34:25 42:9 42:12 44:7 47:23 48:22 49:14 68:9 76:18 83:17 84:16 97:12 102:7	110:12,22 113:7 114:23 119:2,12 121:10 124:17 128:17,18 140:17 141:2 143:4 147:21 154:7,23 correctly 8:2,22 13:17,24 68:12 102:5 145:14 cosmic 25:5 count 8:14 94:18 counts 80:3 168:23 County 170:23 171:2,19,25 couple 44:4 course 15:22 25:3 25:14 61:18 115:12 118:4 156:20,21 157:15 160:22 courses 15:20,23 18:9,10 court 1:1 4:24 171:3 covers 75:4 cows 156:13 co-founders 40:19 co-opting 113:17 Creascience 45:7 created 28:10,15 30:16 35:13 54:25 158:12 creation 45:7 54:12 69:5 70:19 71:25 74:8 75:2,21 93:9 107:23 158:14 creationism 18:20 18:22,23 40:3 42:15 43:20 45:6 45:21 67:21 68:1 69:7 73:8,13,17 73:19,21 74:1,4,5 74:12,14,16,22,24 75:3,8,9 76:7,8,18 76:21 77:3,6,7,12 94:18 creationist 40:5 74:19,20,23 75:13 75:22 76:23,24 creationists 47:2,8 49:6 53:19 57:21 68:23 69:2 75:11 87:14 89:14 94:9 95:3,16 150:24 creator 70:21 158:4 criteria 49:12 critical 72:21 150:1	criticism 110:12,17 criticisms 110:10 crucial 99:13 166:16 crucially 160:17 CSI 34:15,20 111:3 111:12,23 112:9 CSR-4467 1:23 171:23 current 6:14,16 41:18 123:4 currently 6:18,19 17:9 41:7 126:22 143:11 147:15 curriculum 3:17 125:22 cursory 19:14 CV 1:10 39:14 CYNTHIA 1:6  D D 1:7 3:1 4:5 Darwin 23:20 56:8 56:18 67:7 132:8 132:11 136:11,15 152:14 Darwinian 25:15,16 26:7 30:4 33:13 108:22 133:11 140:2,5 146:20 Darwin's 23:14,17 25:17 67:4 126:11 126:13 128:21,24 129:4,10 132:1,5 132:10 133:2 136:5,14 152:8 data 10:21 104:22 121:22 122:4 134:2 DATE 1:19 Dated 171:20 day 42:1 164:6 168:14,15 170:19 day-to-day 5:2,18 deal 82:12,17 dealing 138:4,12 dealt 41:11,12 debated 120:22 DEBORAH 1:5 decided 95:19 decipher 117:15 decisive 144:1 deductive 8:17 9:9 9:12,14,16,20 144:20 146:9 deep 144:12	defend 43:3 defendants 1:14 2:15 4:15 20:3,19 21:5 45:12 define 44:10,13 47:9 60:13 66:13 70:13 92:25 98:11 defined 81:7 98:5 134:21 defines 33:24 82:25 112:19 115:24 defining 70:2,3 71:6 71:19,25 82:23 93:21 96:5,6,18 116:2 definitely 89:13 definition 7:8 73:13 76:1 87:9,12,15 87:22 93:16 99:2 99:23 105:24 110:8,13,16 115:8 115:22 134:20,23 definitional 107:20 131:1 definitions 93:5 degree 15:17,17 16:1 24:9 89:6 98:14 121:25 122:12 145:2,5,23 145:23 146:11 delete 29:9 deleterious 32:3,4,5 32:6 Dembski 12:9 20:22 34:14,15 87:17 89:11,13,25 90:6 98:12,15 100:1 112:1,11,19 115:20 Dembski's 12:11 34:9,11,20 85:10 86:24 87:6 111:1 111:17,23 112:17 demonic 156:11 demonstrate 90:2 116:23 demonstrates 34:4 dense 28:14 deny 162:16 depart 113:9 156:8 166:17 departed 109:21 157:19 departing 137:5 department 17:9,21 18:1,8,9,10
---	---	---	--	--

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

6

departments 23:6	98:10,11,15,21,25	38:10,11 45:10,25	117:15	152:18 156:18
departs 109:11	99:2,3,6,9,10,11	47:16,22 48:2,4,6	discovery 83:14	162:1 164:25
118:20	99:16 100:4,5	48:6,10,13,15,15	84:12,14	166:19 168:18
departure 114:3	101:23 108:25	48:18,19,20,21,24	discuss 47:3	dominant 44:23
depend 26:20 122:3	109:15,20,23	48:24 51:1,22	discussed 21:15	done 7:1 18:17
122:10 129:9	112:10,17,19,19	55:8 59:6,22 64:9	50:11 51:11 58:7	21:14 26:21,22
depending 24:13	114:6 115:15,24	65:14 69:24 70:6	60:18 81:1 93:22	37:23 38:6 42:24
26:17 36:11 51:2	116:2,7 117:9	70:7,19,24,25,25	104:19 109:5	52:23 63:3 73:2
51:17 95:12	118:18,20 121:2	72:20 74:17,21,25	135:20 140:21	75:2 85:25 114:21
depends 14:11	123:20 127:25	76:14 85:5 92:5,6	154:8 163:22	143:11 152:9
25:22 84:4 149:1	128:2,6 136:3,6,8	92:10 93:2 96:12	169:8	163:17 164:24
DEPONENT 1:18	136:18,22 137:5	99:21 104:11,12	discussing 9:20	165:18
deposition 4:18,21	150:24 157:24	105:12,18,22	66:19 92:24	door 95:23 162:3
19:4 22:8 43:25	158:3,13 164:23	107:13 109:1	discussion 37:5	double 15:12,15
66:8,10 141:22	designed 23:10 30:1	112:25 118:18	51:13 60:17 74:3	52:23
169:17	113:11	121:7 126:20,21	140:11 153:4	doubt 68:4
deprived 31:23	designer 89:17,22	129:2 132:16,17	163:3 165:1	Doubtless 5:9
derive 34:5	90:10 109:20	138:11 141:11,16	disproof 146:6	Dover 1:12,12 3:15
derived 33:10 35:19	116:24 118:2	150:7 152:22	disprove 106:14	down 65:12 128:19
descent 46:17,20,23	123:18 136:25,25	155:7 163:6	107:2	142:6
47:15 48:14 66:25	desires 120:6	differentiate 92:7	disproven 106:17	dozen 46:6
67:4 104:19,23	detail 66:21 94:24	92:11	disproves 146:4	Dr 4:10 35:10 44:12
144:8,10,11,12	detailed 90:17	differently 123:5	dispute 10:24	52:17 59:10 60:21
145:3	details 86:21 145:7	differs 136:4,14	126:22	66:12 75:17 81:20
descented 67:2	detect 121:8 157:24	difficult 5:22 66:14	disqualified 54:7	87:25 96:16
describe 68:9,13,13	158:13	142:17	disqualify 53:23	103:17 110:4
68:25 77:19	determinable 83:22	digital 23:9 24:19	62:20 63:22 64:4	116:18 125:19
described 22:10	determinative 63:8	dinosaurs 142:20	dissertation 7:3,6	130:22 140:25
69:3 100:10	63:11	direct 125:23	142:19	148:9 154:16
128:16 132:13	determine 46:25	directed 42:23	distance 79:13,14	163:1
139:12 152:21	49:13,25 52:4	142:18 151:15	79:18 83:19	draw 4:22 49:16,19
describes 88:6	53:21 55:12,25	152:4,16	distinction 77:3,5,8	92:22 99:20 103:9
describing 28:2	61:23 82:13,19	direction 153:13	92:3	117:17,19,23
90:24	92:20 100:25	directional 151:21	distinguish 92:12	118:14 121:13
description 88:8	118:6 157:22	152:12	distinguished 92:14	122:10,18 141:9
design 10:24 11:3	158:3	directly 34:12,20	distinguishing	142:8,11 147:19
11:21 12:2 18:13	determined 46:2	104:22 105:5	162:5	drawing 47:18
18:20,23 22:21	95:18	139:22 171:15	district 1:1,2,12,12	drawn 122:5
40:2,3 42:8,15	determines 55:15	DIRECTORS 1:13	41:21,25	draws 51:15 117:22
44:7,13,14,21,23	determining 58:22	disagree 47:14	districts 41:13	120:3 141:18
44:24 45:2 46:4	82:20	disagreed 20:12	diverged 87:6	drift 67:8 147:2,4,7
46:18 47:2,8,13	Detroit 1:22 4:1	disagreement 19:23	156:22	Drive 2:12
47:20 48:3,4	developed 160:1	47:16 127:14	diversity 56:9	drop 128:19
67:21 68:7,8,11	devoted 140:20	disagreements 49:1	Divine 90:9	dropped 72:13
68:16,22,23 69:1	dichotomy 11:1	disbelief 56:22	DNA 25:6,7 30:2,3	drug 104:6
69:3,4,11,13,19	85:18 100:7	discipline 12:17,24	30:13 31:16,17	duly 171:7
70:1 71:13 72:10	die 38:7	discourage 40:9	document 94:18	during 159:17
72:15 73:2,16,18	differ 46:18,22,25	discover 84:8 101:5	documented 94:10	duty 6:9
73:21,25 74:4,8,9	47:6 48:13 75:2	160:3	documents 96:10	dynamic 151:13
75:1 76:18,20	92:8	discoverable 83:12	doing 7:18 8:1	
77:4,6,7,9,12,16	difference 8:7 10:9	discovered 23:20	10:11 14:9 21:18	E
87:11,14 89:14	56:24 103:4 106:2	83:20 101:1	36:12 57:2 60:2	E 3:1,11 4:5,5,8
90:1,7,14,19,21	different 8:24 10:22	128:22 129:21	84:24 91:14	141:10 147:23
90:24 94:9,21	11:18 17:12 23:6	159:17 163:13	113:17 122:24	170:3,3
95:10,16 96:2	24:6 25:22 30:22	discoveries 169:6	138:6 144:24	each 26:3,24 27:22
97:1,16,18 98:5	32:3 37:9,10	discovers 79:4	149:7 151:10	33:15 38:13,15

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

7

69:25 71:14 102:16 earlier 19:2 51:22 60:22 63:13 91:11 128:17 135:11 138:16 146:3 153:3 156:14 early 19:3 40:17 45:3 143:2 earth 75:8,9,10,11 159:12 160:13,20 easily 94:10 140:6 152:23 East 6:15 easy 94:17,18 151:7 152:22 ecology 17:11 Ed 40:18 edification 48:17 education 39:12 42:5 43:4 educational 15:10 39:17 effect 96:24 97:5,12 103:7 120:15 141:13 147:23,25 effects 104:6 157:9 efficacy 104:5 146:23 efficiently 27:17 effort 23:3 113:19 157:22,24 efforts 42:22 eight 16:2 either 11:11 53:7 60:18 76:16 143:18 element 93:7,10,19 94:11 96:18 101:19 elements 69:15,16 69:25 71:6,8,14 71:15,21 72:9 81:18 94:4 104:2 104:3,18 110:23 138:2,19 166:4 169:11 eliminated 94:15 Elizabeth 1:23 171:23 elliptical 160:7 161:3 elucidate 63:6 elude 37:13 embarrass 6:5 embodied 88:18	embraces 48:8 emergent 80:16 81:3,6 emerges 35:21 emphasize 94:7 empirical 8:4,5 73:3 73:4 77:23 95:17 95:18 162:2,5,9 165:18 166:4,13 166:15 167:25 empirically 162:21 employment 6:16 15:25 encountered 78:14 encourage 42:3 encouraged 42:10 encouraging 39:21 end 27:2 33:17 49:4 101:18 103:5 134:11 endeavor 63:11 142:13 endorse 95:22 endorsing 91:3 ends 166:13 endurance 5:25 energy 27:8,13 36:19 engaged 54:10 72:10 124:22 165:10 engages 165:6 engaging 166:12 Engineering 17:10 enough 22:16 60:2 86:21 93:15 121:15 entail 112:18 113:21 155:9,11 entailing 109:24 115:25 116:22 entering 107:25 enterprises 92:10 entertain 107:4,11 107:16 entire 133:18 entirely 166:4 entity 160:20 environment 24:11 24:17,19,22,22 25:5,12,23,24 26:12 27:12 30:15 32:1 36:7,17,20 151:21 environmental 25:18 36:7,25	37:8,17 epicycles 161:4 episode 138:3 equal 130:4 equally 133:23 equivalent 27:18 91:13 98:18 era 137:24 156:14 essential 70:5,7 94:11 96:19 100:11 101:19 103:19 104:9 110:2 125:13 essentially 24:20 61:21 77:24 84:24 91:2 98:18 116:2 121:25 122:10 137:13 157:10 established 114:22 114:24 et 145:21,21 evaluation 86:13 EVELAND 1:6 even 17:13 60:24 69:7 73:22 80:15 87:1,15 88:15 93:2,12 99:4 112:1 114:12 115:20 129:3,6 133:3,9 134:13 135:16,20 138:5 152:18 157:10 159:8 166:25 167:5 168:3,24,25 event 137:12 events 7:23 ever 162:21 every 93:11 102:12 127:19 everyday 118:6 everything 160:21 evidence 10:19 46:16 49:17 61:3 70:22 84:20 102:18 119:1,10 119:23 122:5 128:22 129:21 130:7 132:24 133:15 134:1,10 141:2 143:14 144:1,3 145:5,10 146:12 148:2,3 157:3 evidences 116:16 evident 140:15 evidential 144:13	145:3,4 evidentiary 119:15 133:7 evolution 18:12 22:20 30:11 32:16 33:6 38:25 39:8 39:19 40:22 44:16 66:15,17 74:6 75:14 76:2,7,8,10 76:11,14 77:8,13 77:13,14 108:23 109:2,4,9 112:4,5 113:2,5 115:11 126:16 127:18,24 128:3,7,11,12,15 132:13,15,15 133:21 135:9,25 137:21 138:12 139:5,24,25 149:22,23,24 150:6,14,15,19 151:2,16,17 152:4 152:13,18,20 159:11 evolutionary 17:11 18:12 22:20 23:8 23:13 30:4 31:17 32:15,15,21 35:1 39:3,4 44:17 48:18,21,23 49:2 58:20,22,24 59:12 59:15,18,21 60:2 62:1,3 66:24 104:18 110:24 111:18 114:25 126:21,24 132:4,9 132:12 133:3,11 133:12,23 137:7 138:6,20 139:2,3 139:15,19 140:12 143:22 146:19 147:3 148:20,21 148:21,23 149:3 149:18 151:12 evolve 23:9 26:16 27:14,20 29:15 30:9 33:5,6 34:18 34:21 127:1 evolved 38:18 115:4 115:4,9 143:2 evolves 138:13 evolving 18:13 22:21 23:2 138:1 151:19 exact 91:2 exactly 26:7 27:2	39:13 104:25 111:25 125:10 Examination 3:7 examined 4:7 example 12:2 24:7 27:17 28:22 37:4 37:9,11,12,21 46:17,19 47:15 52:16 54:3,15,20 56:8,16 57:14 58:13 61:25 63:19 64:17,18 76:8 79:3,7,10,12,19 79:19 80:21 83:7 83:18 84:13 90:11 94:25 95:15,17 99:8 102:11 106:23 109:9 117:8,14 119:21 127:2 128:25 141:17 142:15,18 142:25 147:5 149:25 150:11 153:14 155:15,18 155:20 156:10,12 159:25 examples 34:17 70:25 119:11 133:18 156:11 169:9 except 30:3 exceptional 127:19 exchange 4:25 excluded 47:17 Excuse 73:10 execute 27:9 executing 24:2 exhausts 69:15 Exhibit 44:1,2 125:17 128:20 exist 24:19 31:25 104:16 116:17 162:21 164:3 existed 45:1 146:14 existence 106:14 150:5 159:10 existing 122:9 exists 113:25 163:24 163:25 experiment 24:14 26:17 27:24 102:13,20 experimental 18:12 22:20 102:22 152:2 experimentation
---	--	--	--	--



ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

8

101:12,17 103:23 141:15 146:19 <b>experimented</b> 132:22 <b>experiments</b> 23:9 26:14,21 92:19 100:25 101:22 130:15 141:5 143:10,11 147:15 157:4 <b>expert</b> 3:15 4:16,18 18:25 19:6 21:15 40:23,24 41:2 45:16 <b>expertise</b> 18:20 43:20 128:24 <b>experts</b> 19:9 20:2,18 20:18 37:6 40:20 45:12 <b>Expires</b> 170:24 <b>explain</b> 8:7 9:3 10:8 11:22 12:4,5,10 12:12 33:1 37:18 64:8 76:20 84:5 85:1 87:5 109:3 135:4 156:3 157:9 <b>explained</b> 7:18 10:17,18 138:24 154:25 <b>explaining</b> 7:19 37:7 90:21,22 <b>explains</b> 7:24 <b>explanation</b> 7:8,11 7:14,15,17,22 8:1 8:14,19 9:8 10:1,2 10:6,9,14 11:2,5 11:12,19 12:6,13 12:16,21,23,25 13:14,16,16 23:23 25:15 44:12 60:9 80:21,23 84:22 97:13 111:22 134:22 135:7,12 135:13,16,19,22 135:23 136:4,7,8 136:19,21,22,24 137:2,6 156:12,13 <b>explanations</b> 56:9 96:21 97:9,14 135:5 <b>explanatory</b> 115:21 <b>explicate</b> 13:10 <b>explicating</b> 10:12 14:17 166:8 <b>explication</b> 13:2,2,5 13:14,17,24 97:13	135:18 <b>explicit</b> 14:15 <b>explicitly</b> 14:9,10 43:5 46:11 47:14 48:9 61:1 77:16 93:8 94:9,15 95:22 96:13 98:16 101:21 112:1,20 116:8 123:22 137:24 <b>exploring</b> 140:21 <b>expressed</b> 69:20 70:6,17,24 71:4 <b>expressions</b> 56:4 <b>extent</b> 6:9 88:23 114:19 <b>extra</b> 14:12 27:10 27:13,13,20 <b>extrapolated</b> 62:24 <b>extrapolation</b> 153:17,20 <b>extraterrestrial</b> 85:15 88:16 <b>eyes</b> 47:22  <b>F</b> <b>facet</b> 114:2 <b>fact</b> 60:1 83:11 91:21 95:18 99:3 100:3 117:18 130:23,25 131:5,5 131:11,18,20 132:3 133:3,3,5 133:10 134:13,17 142:7 143:23 165:19 <b>factors</b> 23:10 36:25 37:8,17 <b>facts</b> 21:13 <b>factual</b> 131:10,23 132:24 134:6 145:6 <b>faculty</b> 17:9,10,21 18:4 23:3 <b>failing</b> 16:21 <b>fails</b> 109:11 <b>failure</b> 105:23 <b>fair</b> 14:8 40:11 108:17,18 123:17 168:9 <b>fairly</b> 37:9 76:16 87:13 93:10 <b>faith</b> 160:19 164:22 <b>fall</b> 81:8,11,19 85:19 156:4 <b>fallacious</b> 133:19	<b>fallacy</b> 99:1,21 <b>failing</b> 169:3 <b>false</b> 10:1 <b>familiarize</b> 22:7 <b>familiarizing</b> 21:8 <b>far</b> 18:19 20:8 42:24 56:24 96:4 97:20 110:25 112:13 <b>fashion</b> 19:14 168:14,15,16 <b>faster</b> 37:11,21 38:8 38:13,18,22 <b>fault</b> 150:25 151:10 <b>favor</b> 74:7 76:2 89:5 <b>favorably</b> 36:14 <b>feathers</b> 142:19 143:2,2,12 144:4 <b>feature</b> 24:25 36:10 57:17 94:1,8 111:7,8 122:19 125:14 140:11 160:12 <b>features</b> 24:24 30:5 73:19,24 74:5 76:23 82:20 94:2 94:20 95:8 135:3 <b>feel</b> 6:7 <b>FENIMORE</b> 1:5 <b>few</b> 4:21 22:18 140:9 148:4 154:18 157:13 <b>fiat</b> 164:3 <b>fiction</b> 133:17 <b>field</b> 49:1 134:9 140:18 151:14,16 <b>fields</b> 132:21 <b>figure</b> 155:21 157:18 160:4,5 164:6 169:9 <b>figured</b> 79:16 <b>figures</b> 46:6 160:7 <b>filter</b> 115:21 <b>finally</b> 165:1 <b>find</b> 5:9 14:13 18:6 20:12 27:10 45:22 55:1 56:9,12 66:14 83:10 85:17 86:22 95:25 100:24 109:8 126:19 127:11 128:13 130:8,13 130:24 134:2 144:3 153:5 165:21 <b>finding</b> 83:11 84:23 84:25 86:9	<b>findings</b> 91:6 <b>finds</b> 107:21 <b>fine</b> 13:23 14:23 20:16 45:17 55:1 101:8 103:13 124:20 151:7 <b>fine-grained</b> 132:18 <b>first</b> 4:6,24 19:16 20:10 67:15 68:3 73:9 78:18 97:24 108:20 109:2 128:20 131:2 138:16 142:25 150:10 161:10 171:6 <b>fit</b> 11:3 140:6,7 <b>five</b> 39:13 154:11 <b>fix</b> 26:19 <b>flag</b> 96:7 <b>flare-up</b> 40:6 <b>flat</b> 159:12 <b>flipped</b> 19:21 <b>Floor</b> 1:21 <b>focus</b> 15:1 19:24 49:18 51:5 57:6 130:2 <b>focused</b> 139:11 165:2 <b>focusing</b> 61:16 136:10 137:25 <b>folks</b> 94:25 121:2 137:13 139:23 <b>follow</b> 72:5 99:18 <b>followed</b> 21:21 22:6 167:24 <b>follows</b> 4:7 <b>food</b> 27:16 142:21 <b>foot</b> 96:17 <b>footnote</b> 73:14 80:18 <b>force</b> 105:4 <b>forces</b> 82:5,8 156:15 160:9 <b>foreign</b> 5:13 7:2 22:22 <b>forgive</b> 14:20 22:2 24:15 28:13 142:16 <b>form</b> 9:1 11:23 17:18 37:2 47:24 59:1 64:7 77:12 79:5 98:13 103:10 123:12 155:14 159:20 167:17 <b>formal</b> 8:22 46:11 <b>formed</b> 141:23	<b>former</b> 10:15 152:1 <b>forms</b> 67:2 77:7 83:23 <b>forth</b> 64:24 <b>fortuitous</b> 36:18 <b>forward</b> 11:11,15 52:11 53:9 54:1 54:23 58:9,16 71:24 72:7 83:7,9 129:17 152:4 <b>fossil</b> 142:9 144:3,4 <b>found</b> 11:16 71:18 101:5 112:4 122:5 141:8 163:14 167:4 <b>founded</b> 40:13 <b>founder</b> 40:12 41:1 <b>founders</b> 40:14,18 <b>four</b> 69:10,14,25 71:8,14,21 72:18 75:12 <b>framework</b> 92:16 92:23 106:5 115:2 <b>Frank</b> 2:12 <b>FREDERICK</b> 1:7 <b>frequency</b> 25:12 <b>frequently</b> 5:2,19 <b>fringes</b> 138:8 <b>from</b> 4:21 7:1 9:5 11:18 15:9 17:2 17:12 18:11 19:5 19:6,10,15 23:4 26:12 32:4,22 33:10 34:5 35:20 36:20,21 37:8,23 46:7 48:18 51:22 57:7 61:8 62:24 63:16 65:19,22,25 70:17 79:14 84:4 84:13 85:24 87:6 87:22 89:9 90:11 92:11,12 94:20 98:25 99:17 107:13 109:11,21 111:16,20 113:9 114:3 116:16 117:14 118:20 119:21 133:19,20 136:4,14 137:5 138:6,11,21 140:25 141:2 145:4,14 146:3 151:7 154:19 156:8,22 157:19 160:15 161:6 162:10,17,19
---	--	--	--	---



ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

9

167:5 169:3 fulfilling 115:8 fulfills 114:13 full 6:11,21 16:11 96:20 101:10,12 101:16 158:6 161:10 Fuller 20:23 fully 85:21 157:12 169:10 function 31:5,24 34:2,3 39:17 84:8 99:9 100:17 103:5 115:5 149:14,16 functional 33:16 functioning 115:7 functions 27:21 30:6,9 40:4 94:10 fundamental 69:12 69:21,22 165:8 fundamentalist 159:8 funny 156:19 further 61:3 119:15 122:18 133:25 143:24 169:16 171:13 furthermore 115:9 fuzzy 139:17	generality 77:5 generally 39:1 40:8 42:22 59:16 71:18 132:12 139:7 generator 28:3,11 28:16,20 32:7 36:3,5,9 generic 75:4 genetic 67:7 147:1 genetics 67:8 137:20 137:23 genome 23:25 24:6 28:19 29:1,2 30:24,24 geological 120:22 142:3,9 geology 141:23 gesture 100:1 gestures 5:3 gesturing 125:11 156:5 gets 31:1 71:3 75:18 137:10 142:2 144:19 156:1 160:4,11 161:1 165:19 getting 27:10 30:11 60:20 66:4 69:17 78:1 101:24 103:2 160:9 Gillen 2:10 3:7 4:9 4:14 9:4 11:9,13 11:25 14:19,24 15:6 17:19 22:1 22:16,17 31:19 32:13,17 35:5,9 37:3 44:3 47:25 50:25 51:20 53:1 53:4,15 59:5,8 60:6 62:21 64:16 66:5,11 74:10 82:16,18 98:3 103:13,16 123:9 124:9 125:16,18 126:2,3 128:8 148:11,14 154:10 154:13,15 155:2 155:16,17 159:22 162:24 163:4 169:16 give 6:14 7:8 13:3,4 13:4 14:5 15:4,10 15:25 37:4,20 44:11 49:17 50:21 52:2 58:13 60:15 63:18 64:17,18	66:21 73:24 79:7 79:10 90:5,16 91:1 99:15 103:21 110:18 141:17 142:15 145:22 149:25 155:4,15 159:2 161:24 166:2 given 25:2 58:5 75:21 84:6 91:9 111:25 119:11,16 119:24 122:9 129:4,4,5 166:23 171:10 gives 12:21 13:2 27:12 36:19 87:22 127:19 160:23 giving 12:6 36:18 69:16 90:20,25 130:14 glorify 52:8 go 15:8 19:18 35:25 45:13,25 48:15 59:9 64:24 65:25 70:12 79:9 95:24 96:9 104:14 123:12 131:2 140:8 141:8,11 146:25 147:24 150:16 153:9 161:5 168:2 goal 43:1,3,4 94:12 158:10,10,12 goals 43:21 God 45:8 52:8 54:25 55:9 56:10,13,22 57:4 62:2,18 69:6 70:20,21 71:3 72:25 73:3,6 76:12 77:15 123:22 136:24 150:5 156:4,6 157:17 158:11 169:2 God's 54:12,14,22 goes 18:21 92:17 143:24 153:3,5 166:9 167:22 going 5:20 13:13,22 22:2 26:9 35:10 35:22 51:8 53:18 57:20 60:23 94:24 118:21 121:23 122:15 123:1 129:9 130:16 137:16 138:25	164:18 166:17,17 168:17 gold 101:23 102:3 102:20 140:16 141:3 good 4:10,11 5:20 22:16 103:12 132:23 135:23 143:14 158:8 169:5 Gospel 90:7 Gotcha 8:10 gotten 141:21 governance 93:9 107:23 governed 157:23 graduate 15:11,13 15:21 17:1 23:5 158:6,7 grammar 165:20 grammatical 8:3,16 grasp 16:21 gravitational 64:25 85:4 100:25 129:12 155:25 160:9 gravity 64:23 65:11 65:12 79:19 83:13 84:14,23 100:20 101:5 106:12 155:18 163:3 great 164:12 greater 25:12 37:12 grip 36:24 gross 160:12 ground 94:13,14 167:1 group 23:5 42:2,3 44:14 46:5,10 48:6,15 65:6,7,7 65:21,22 103:1 146:20 grouping 68:6 grow 25:25 grows 139:21 guess 16:23 28:6 52:17 53:7 63:9 69:17 70:15 71:12 78:23 108:3 121:4 122:21 123:1,9 124:18,20 129:16 140:24 144:6 147:10 148:19 155:6,13,16 159:16 161:20 guided 124:23	guiding 152:17 Gull 41:20,22 42:6 guy 142:18  H b 3:11 4:5 half 46:6 75:12 hallmark 93:17 103:17 154:22 Hamilton 2:4 hand 75:11 94:5 105:19,20 106:9 112:7,12,14 140:3 144:2 149:22 171:18 handle 10:23 14:21 24:15 80:11 happen 24:12 25:1 25:21 31:15 32:2 33:6,7,8 34:7 67:12 100:22 127:3 133:16 147:16 152:1,11 156:7 160:22 164:9,15,21 happened 33:18 100:19,22 143:16 150:17 151:24 happens 25:10,12 26:1,2 29:3 31:14 32:8 36:11 104:17 138:13 139:20 141:22 150:15 151:3,4 hard 73:7 128:10,13 133:9,13 166:25 harder 92:25 Harrisburg 2:6 Haught's 20:6,11 having 4:6 67:13 92:18 129:7 150:17 head 5:2 90:18 heading 44:8 47:4 47:19 48:12 68:6 97:23 100:7 heads 156:22 heard 139:9 bearing 142:25 held 69:20 74:3 heliocentric 160:1 help 9:19 39:19 41:25 42:17 43:1 43:4 51:25 52:13 64:12 92:20 helps 32:9 62:17
---	--	---	---	--

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

10

149:19 her 43:5,6,16 90:20 90:20 herd 37:11 herds 37:9 heretical 160:18 hereunto 171:18 heritable 23:21 35:3 67:5 hexing 156:12 hieroglyphics 117:21 higher 25:11 26:16 81:16 highlight 5:8 144:15 highlighted 131:3 highlighting 131:1 highlights 93:25 Hills 41:21 42:13,19 42:23 him 11:7 82:14 89:11 90:11 123:9 154:24 155:15 157:15 158:2 159:21 himself 22:8 136:11 136:16 160:3 165:9 hinge 84:17 hinges 84:14 historical 54:8 137:12 138:3 140:13,23 147:19 154:19 159:18 historically 120:19 168:24 history 15:13,25 78:16 hit 86:14 hold 6:18 48:6 71:13 72:18 74:25 81:5 88:24 89:11 96:15 166:3 holding 65:12 72:14 holds 47:1 65:7 67:1 72:17 74:9 75:9 77:14 89:3,7 110:9 141:12 144:21 hope 86:9 human 5:8 88:16 117:23 120:5 121:19,21 122:13 122:17 hurt 38:16 hurts 32:9	hypotheses 23:8 32:16,18,20 48:25 66:17,18,18 67:3 67:11,16,18 101:24 126:23 129:13 130:10 131:22 132:20,21 134:10,16 135:2 141:6 142:14,23 143:17,22 146:22 157:8 hypothesis 10:20 45:7,8 69:5,6 84:6 108:3,6 109:18 132:25 133:1 143:1,14 162:6 hypothetical 56:16 57:14 59:23 64:18 133:17 164:14  I IC 89:10 ID 19:6 46:21 49:6 53:19 57:20 76:23 80:14 88:15 89:21 98:5 IDC 96:18 IDCs 60:13 idea 14:12 22:23 152:4 identification 3:13 44:2 125:17 identified 71:8 112:2 114:2,9,20 149:17 identifies 88:21 identify 68:21 94:4 94:14,17 113:20 identifying 91:3 113:23 idiom 90:8 III 2:3 44:8 illnesses 156:12 illuminating 61:16 imagine 61:13 64:22 128:10 133:14 134:13 144:4 164:11,19 166:25 immaterial 88:17 implementation 23:15 implication 153:21 154:2 implications 50:11 50:19 implied 88:10	implies 78:4 importance 90:22 important 135:22 162:15 imposed 26:12 imprecise 5:10 95:6 imprecision 5:8 improper 160:14 incapable 10:6 include 15:3 24:8 67:4 68:16 135:2 138:9 142:13 included 46:13 47:4 47:17,19 48:12 132:20 138:8 includes 82:3,4 115:18 132:16 166:21 including 42:15 46:21 127:24 inconsistency 123:24 inconsistent 89:20 89:23 inconsistently 98:21 100:5 incorporation 40:9 indeed 88:20 indented 125:24 136:2 independent 41:20 102:23 independently 137:22 165:18 indicate 47:3 153:7 indicated 26:10,23 57:19 76:17 143:9 152:9 154:21 indicates 86:20 118:17 124:1 140:11 158:9 indication 125:12 indicative 86:11 indirectly 171:15 individual 46:24 47:6 49:25 52:4 52:18,20 53:22 61:10 63:8,10 64:6 inductive 9:12 145:2 146:9 inductively 146:11 inevitably 58:10 infer 104:23 121:21 148:1 inference 89:9	109:23 112:17,20 120:3 154:2,5 inferences 92:22 103:10 117:13,22 117:23 119:10,16 119:24 120:3,11 121:5,9,16 122:10 124:7 141:1,9 142:12 147:21 inferred 104:20 influence 23:11 79:14 146:6 informally 116:9 information 34:10 34:11,14 42:24 43:5 61:5 62:10 62:11 90:8 111:5 112:3 113:15 114:11 118:13 120:5 122:6,11,13 137:18 141:14 143:18 147:17 ingredient 100:11 103:20 inherent 125:13 inherently 131:15 inherit 30:8 initial 19:6 21:19 40:19 initially 42:18 123:16 inquire 50:6 inquiring 51:21 inquiry 52:5 53:23 54:10,13 57:7,24 63:9,23 105:24 124:22 157:25 insect 144:4 insects 137:17 142:21 143:3,13 inside/outside 78:7 insisted 88:20 instances 41:10,16 instantiate 23:22 25:19 28:7 30:1 37:19 140:4 instantiated 26:7 30:12 31:23 67:9 instantiates 23:13 23:14 37:16 instantiation 25:17 instead 102:12 institute 95:13 instruction 8:23 18:8 24:6,9,10 25:7,7 28:21,23	29:5,7,9,10,19,25 30:6,7,14,15,18 31:6,24 35:12,20 38:9,10 40:10 instructions 23:25 24:1,2,4,8,18 25:8 27:9 28:24 29:1,3 29:6,21 30:23 31:1,7,10,14 35:14,19 37:25 38:2,3,16 115:6 insufficient 119:23 integrity 42:4 intelligence 80:15 80:21 81:3,5 85:16 112:10 121:6,8 intelligences 88:16 88:18 intelligent 10:24 11:2,21 12:2 18:20,23 40:2,3 42:8,15 44:7,13 44:14,21,24 46:3 46:18 47:2,8,13 47:20 48:3,4 67:21 68:6,8,11 68:16,22,23 69:1 69:4,10,13,18 70:1 71:13 72:10 72:14 73:2,16,18 73:21,25 74:4,9 76:17,20 77:4,6,7 77:9,12,15 87:11 87:14 89:14 90:1 90:2,7,14,15,19 90:21,24 94:9,21 95:9,15 96:2,25 97:16,18 98:10,15 100:4 114:6 115:15,19 116:13 116:16 117:2,4,9 119:2,4 121:2,9 123:19 124:15,24 127:24 128:2,6 136:3,6,8,18,22 137:4 150:24 164:23 intend 52:7,8,9 intended 64:1 68:7 153:2 intent 123:7 intentionally 48:8 intentioned 99:11 interaction 33:25 interconnected 34:1
--	--	---	---	---

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

11

interdisciplinary 23:5	32:24 33:2,21	61:18,23 62:4	Keystone 2:5	knows 109:13
interest 39:22	34:12,13 88:7	64:18 65:10,18	kind 7:17 13:18	<hr/> L
155:22	108:2,5,10,13,16	66:21 67:18 68:18	24:13 26:17 34:13	LaBarge 1:23
interested 26:19	108:20 111:8	69:16 71:5 73:17	59:17 74:4 75:3	171:23
32:20 43:11 62:9	113:14,20 114:1	73:22,24 75:18	76:18,21 77:6	lack 119:15 121:17
171:15	114:20 115:8	76:12,20,24 77:17	86:10,20 93:13	121:22
interesting 127:20	irreducibly 33:4,6	80:4,11,23 81:1	101:23 116:13	Lake 41:20,23 42:7
139:9 151:25	33:10,16,19,24	81:24,25 82:10,25	118:1,15 119:3	Lamarek's 152:8
155:21 156:23	34:5,18 88:21	83:13 84:17 87:10	123:25 124:14,24	Lane 6:15
159:1 164:19	109:10 114:10	89:5,9 90:18 95:4	129:1 131:13	language 25:8 131:6
interlinked 132:20	Isaac 54:10	95:7 98:8 102:1	143:8,25 150:8	145:17
interlocutor 64:23	issue 55:17 96:8	102:23 103:24	159:9 164:14	Lansing 6:15
internal 96:10	106:6 131:1	104:2 105:13,16	167:11	larger 7:5 34:17
interpret 152:23	issues 46:17 85:3	105:21 108:5,8,8	kinds 9:12 37:10	last 18:23 36:23
interpretation	126:20	108:12 109:9	47:17 61:13 67:11	49:5 67:7 75:17
48:10 91:22	italics 125:25	110:24 111:3,9,12	88:20 92:10	80:13 87:4 96:16
interpretations	items 70:8	112:5,7,16 115:10	102:16 120:24	96:20 97:23,24
47:22	<hr/> J	118:25 119:19	124:7 132:17	107:15 154:10
interpreting 52:10	Jersey 16:3,7	123:3 124:1,11	143:17 147:6	lately 41:10
interrelationships	126:10 127:2,6,9	126:10 127:2,6,9	157:3 166:15	later 15:8 138:5,5
137:19	Jesus 155:23 158:16	127:15 128:14	KITZMILLER 1:5	160:6
intervene 102:15	JOEL 1:6	129:2,17 130:5	knock 115:6	law 2:11 23:14,17
intervenes 74:11	Johnson 70:18 71:1	131:16,21 132:19	knocks 31:2	25:17 55:2 56:21
intervening 22:9	87:14 95:20	133:1,12,22 134:2	know 4:16 5:1,11,20	96:22 97:4,10
intervention 74:7	John's 90:7	134:11,11,13,15	6:1,7 17:2 18:3,5	98:6 112:24 116:3
interview 86:17	joining 137:22	140:9,13 141:17	32:10 37:23 39:13	120:12 141:23,24
87:2	Joint 15:19	142:17,21,25	40:8,25 45:11,17	lawful 79:5,17,20
interviews 47:12	Judge 55:20 168:22	144:15,23 145:2	45:19 55:24 62:22	83:3,21 84:10,16
intrinsic 26:11	169:12,14	147:10,11,22	63:16,16 65:5,21	100:18 120:16
introduced 4:12	judged 79:3 131:23	148:4 149:23	67:24,24 68:3,5	laws 54:12,14,22,23
introducing 40:9	judging 54:4	150:15,15,17	72:3,16 84:8	54:25 56:13 57:16
investigate 158:11	judgment 55:13	151:1,3,4,22	86:21 87:10,17	64:24 85:4 101:1
investigated 132:22	JULIE 1:7	153:10,14,25	89:2 90:17 96:14	120:12 135:3
investigates 167:20	July 6:24 39:14	156:3,18 157:2,12	97:20 103:7 106:3	155:18,24 157:22
investigating 57:2	jump 99:17	157:20 158:2	106:20 108:1	160:3,7
127:7,10	June 1:19 4:2	159:24 161:5	110:16,23,25	law-bound 96:23
investigation 57:12	171:20	163:18,19 164:3	116:18 118:9	97:5,11
83:23 85:22,25	just 5:5 7:2,3,8 8:3,7	165:2,12,25 166:7	120:24 121:15	law-like 57:2
92:16 100:14,24	9:5,13 10:23 11:7	167:6,13,23	122:13,16 124:16	layman 12:15 165:3
122:25 139:11	13:16 14:18,21	168:13,16,17	124:25 126:24	lead 73:19 160:10
168:7	15:8 17:2 18:16	justificatory 102:18	130:6 132:13	leaders 46:1,3,5,13
investigations 92:19	19:3,18 20:16,25	justifying 92:17	133:22 134:1,8	46:14
143:15	21:12,24 24:15	<hr/> K	136:24 138:23	leadership 46:9,22
investigators 86:7	25:4,18 26:8,19	K 4:5	140:10 141:9,12	leads 110:5
involve 66:24 72:24	27:7 29:24 31:8,9	keep 5:4 169:2	142:4 143:23	learn 27:15 62:17
155:11,13 166:4	31:20 33:1 34:23	Ken 19:20	163:7 164:8 166:7	65:4 83:23 122:16
involved 17:3 28:20	35:11 37:15,20,20	Kepler 160:6,23	167:5 168:13	127:19
40:17 43:10 46:6	38:4 39:4,7,12	Kevin 37:5 142:18	knowing 54:3 153:4	learned 80:1,6
46:15 107:23	41:15,17 42:21	key 9:18 31:11	knowledge 17:24	137:23 163:17,19
involvement 41:16	43:25 44:5,10	57:16 58:1 60:13	21:13 40:21 65:9	learning 64:2
41:22	45:5 46:2 47:5	69:14,25 71:5,8	118:8,8 121:17	111:16,20
involves 42:7	48:17 49:9,18	71:21 72:9,12	122:9,22 123:4,11	learns 53:10
166:10	50:20 52:25 54:8	79:19 94:1,2,12	124:12 133:19	least 4:22 12:14
in-service 42:1	55:11 56:6,20	94:20 95:8 96:13	141:7,20,22	34:14 54:19 55:3
irreducible 12:3	57:9,18 58:13,14	136:18 141:6	143:10 162:9	133:6 134:8 159:5
	59:3,9 60:9,17		166:14,15,16	



ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

12

161:22 leave 49:17 105:17 116:14 153:11 164:5 left 134:9 less 38:12 95:14 102:17 133:25 143:25 let 4:12 5:11 6:1,7 9:7 11:7 15:7,8 18:17 19:18 20:5 20:25 22:18 28:13 31:20 32:10 36:4 37:4,19,20 38:23 40:20 42:6 45:25 48:1,17 49:23 51:1 52:22 54:8 59:9 63:6,19 64:8 68:5 69:9,24 72:23 73:20 74:21 80:25 83:23 85:1 85:5 88:14 92:1 97:7 100:6 102:21 104:7 106:3 108:1 114:18 116:23 118:25 121:6 125:15 128:2,14 132:1 136:1 140:9 144:7 149:24 151:9 155:6 161:9 165:12 lets 33:5 58:15 63:16 65:23 letting 36:19 let's 21:5 45:13,17 51:7 56:12 58:20 104:14 109:8 111:15 125:23 level 81:16 levels 15:11 levitate 65:16 levitation 65:8 LIEB 1:6 life 23:7 67:1,2 136:4,7,10,12,15 136:19 137:7 138:4,9,11,13,16 138:17,21,22,22 139:6,11,13,21,22 139:23 140:21 145:8,11 150:2,3 light 16:13,15,20,23 17:4,7 50:7 61:9 78:15 110:17 126:8 143:19 like 4:22 7:2 9:2	17:16 19:24 22:22 24:1,22 27:2,15 27:22 37:23 38:13 43:25 44:5 62:12 66:12 75:1 83:12 84:24 86:24 104:21 106:12,23 118:9 121:13 122:1,19,24,24 123:21 124:5 129:11,12 130:12 132:21 134:16 136:25 140:4 141:24 145:13 152:7,18 164:11 likely 26:5 37:14 118:11 143:25 likewise 6:4 48:21 limit 121:20 limitations 123:4 limited 29:7,20,22 127:24 limiting 151:4 limits 29:17 122:8 122:22 123:11 124:12 line 31:11 51:15 87:23 lines 145:4 lining 140:21 list 71:16 literature 47:11 68:19 70:6 71:18 75:6 76:15 94:19 135:19 167:2 litigation 4:15 little 6:25 9:3 17:12 38:23 43:14 59:25 66:21 76:14 77:18 82:6 92:4 101:25 111:16 120:18 123:14 129:18 live 133:18 lives 167:10 Lloyd 2:12 LLP 2:4 LOCATION 1:21 logic 8:23,23 9:9,10 144:25 165:20 logical 7:20 8:3,4,5 8:15,17,21,24 9:24 71:11 72:3 164:9 logically 72:4 Logos 90:7,9 long 134:7 140:8	155:4 longer 38:10 43:14 83:24,24 look 9:6 20:10,15 21:16,16 33:17 45:17,23 50:17,18 50:23 53:18,25 54:18 56:2,2,3 57:20 58:20 62:14 63:4,14 73:8 80:12 88:5 90:4 90:16 92:2 104:18 108:19 111:15,23 115:3,8,10 116:18 116:21 131:3 132:1 136:1 153:8 155:24 157:4,6 161:6 164:16,17 165:22 168:25 looked 19:1,8,14,20 19:22 20:3,5,20 20:21 21:7,18 22:5,10 167:1 looking 27:23 41:11 41:14 53:8,11 78:13 86:7,18 88:13 89:25 95:6 128:15 137:16 157:1,2 168:24 looks 13:6 50:15 62:8 68:18 141:18 loosely 139:12 lose 34:3 lot 67:19 94:24 132:9 158:17,18 161:1 lots 93:24 99:6 lower 26:16 129:5 low-level 23:25 31:10 lucky 36:11 lunch 66:5,8  M M 4:8 macroscopic 137:16 made 4:17 28:2 56:23 91:16 95:16 101:8 109:14 110:10 113:2 117:16 126:6,10 169:6 main 21:4 120:21 major 15:12,16 16:13,15,16,20 make 4:24 9:13	14:11 15:1 22:11 35:24 39:5 47:5 49:9,23 51:14 52:19,21,25 64:19 65:9,9 76:23 84:3 86:12 88:19 89:15 92:21 93:15 105:24 107:5,17 112:16 113:25 117:13,17 121:8 122:12 128:14 134:15 141:14 142:16 143:1 146:6 149:10 150:22 152:22 160:25 162:5 166:18 168:3 makers 42:4 makes 6:7 10:8 32:5 33:3 37:25 53:12 59:19 80:18 85:12 94:17 97:8 99:18 105:3 111:12,21 131:17 165:5,10 making 14:15 107:20 124:2 141:20 142:10 149:23 150:25 151:5 167:12,25 168:5 malleable 144:6 manner 104:2 many 44:4,15 57:5 67:17,17,17 72:20 123:20 126:16 134:10 map 30:3 maps 30:4 mark 43:25 125:16 marked 44:2 125:17 marriage 171:14 matched 34:1 material 49:16 81:21 116:4 materialism 81:23 82:1 96:11 materials 42:25 78:13 math 144:25 mathematics 17:3 mathematician 17:5 matrix 133:18 Matsumura 43:16 matter 5:13 7:4 9:7 10:24 14:22 40:10 60:3 80:16,22	81:3,6,22,25 82:3 82:4,4,6 103:1 158:20 167:23 171:6,16 matters 6:10 95:17 may 19:14,20,22 36:12 38:17 53:16 67:24,25 72:16 93:13 105:7,8 116:17 121:1,22 127:12,13 138:9,9 140:1,1,1 148:1 151:1 maybe 8:5 9:2,19 43:14 54:8 59:3 64:9 70:12 72:8 85:5 91:20 95:23 104:7 105:22 106:21 125:2 136:24,25 138:8 143:24,24 144:2,3 154:13 156:3,6 163:8 164:10 mean 8:5 10:16 12:17,22 14:12 21:9 25:23 31:7 34:24 36:1 54:12 60:1,4 69:22 70:20 71:10,12 77:20 78:18,19 79:19 83:8 98:19 98:24 99:6 108:8 120:23 122:1 128:11 129:9 132:19 137:8 138:5 140:20 144:17 145:12 150:10,23 151:17 152:5,14,14 154:1 154:5 159:1,25 162:16 167:9 meaning 50:2,7 58:16 61:10 64:1 106:2 150:2 165:12 meaninglessness 150:3 meanings 54:2 61:17,19,19 99:5 99:7,12 129:8 means 7:14 12:25 13:5 15:4 91:22 97:20 106:16 108:25 111:6 113:10 116:7 129:2,15 149:11
--	---	---	--	---



ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

13

171:9 meant 30:3,12 31:6 61:15 72:5 78:6 105:10 106:21 measurable 79:20 measure 68:6 122:8 mechanism 23:13 23:19,19 25:16 26:7 30:8 31:18 33:11,13 34:16,16 35:1 36:5 67:4,9 108:22,22 114:25 140:2,5 146:13,21 152:6 mechanisms 67:3,6 67:11 138:19 147:1 medicine 167:5 meditation 65:7 meet 20:9 meetings 39:18 45:3 139:5 member 17:9,11,21 39:10,12 41:3 65:5,21 86:17 members 23:4 39:21 40:21 46:13,21 48:6,15 membership 43:19 memory 15:24 19:3 20:15 24:21 mental 50:4 52:7,10 mention 41:10 49:3 135:11 139:2 mentioned 7:6 45:24 89:6 103:17 114:13 136:11 147:1 mentioning 38:14 41:18 mentions 95:20 mere 51:5 70:19 71:24 91:11,12 105:1 165:25 merely 51:13 91:14 merge 138:18 merged 137:13 met 112:13 metabolic 149:16 metabolize 27:16 metaphor 78:5 metaphorically 78:9 metaphysical 50:11 50:19 62:18,22 105:14 106:8,24 107:6 125:8 150:4	150:19 153:8,17 153:20 154:7 metaphysically 107:11 metaphysicians 167:9 metaphysics 167:10 method 86:12,14,24 86:25 94:1 95:7,9 95:23 101:14 102:1 105:6,7 107:14 167:19 168:7 methodological 93:17,19,25 94:7 94:13 96:3,9 97:21 105:6,11 106:5 109:7,12 113:9,22 114:3,7 114:17 117:11 121:12 124:23 125:7 153:16 154:22 155:10,19 156:8 157:10,11 159:19 161:12 164:4,13 165:2,4 165:7,15 166:5 167:14,18,24 methodology 87:5,6 157:7 methods 86:1,4 92:9 92:15,23 93:23 95:18 96:1 100:13 102:2 113:18 Meyer 20:23 Michael 12:3 45:17 87:20 88:19 90:13 Michigan 1:22 2:13 4:1 6:15,17 16:4 23:3 40:12,16 41:1,3,5,13 42:2 170:23 171:1,19 171:19,25 MIDDLE 1:2 might 14:9,10 47:7 54:17 59:24 60:19 61:9,13 64:25 83:9 95:4,16 106:17 110:14 125:3 139:6 140:3 141:21 144:1,15 160:13 162:14,17 163:12,13 166:14 167:7 Miller 19:15 Miller's 19:20	mind 5:4 30:22 53:6 65:14 154:13 166:13 minimal 75:19,23 75:25 Minnich 21:6 89:2,4 Minnich's 21:7 minority 39:22 minutes 154:11 misleading 101:25 131:15,18,19 misnomer 132:5 misstated 110:13 mistaken 120:8 misunderstand 136:15 misunderstanding 107:7 mix 121:2 mode 92:15 model 9:14,18 models 9:12 modern 94:21 101:19 103:18,20 169:10 modulation 86:19 Moleen 43:16 more 2:11 5:12 14:6 14:16,18 15:23 26:5 27:5,17 32:18 36:15,19,20 37:4 38:12 45:3 54:8 55:17 59:25 60:3,7 64:5,10 65:18 78:23 80:19 92:4 95:13 108:12 112:1 120:18 122:17 124:10 126:19 132:8,12 132:18 140:5 144:6 145:17 146:1 147:4 149:25 151:5 152:7,12 155:23 160:12 163:17 168:19 morning 4:10,11 68:12,15 91:10 92:2 162:23 morphology 137:19 Moses 158:25 must 94:5 139:2 159:8 mostly 138:12 motion 82:5 153:1 155:25 157:23	158:3 160:4 motions 158:21 motivation 50:4 54:22,24 55:3 motivations 49:7,12 49:24 52:18,20 53:19,22 60:24 motive 51:18 52:3 54:13 55:5 63:8 63:10 64:5,10 motives 51:23,24 52:9,12,25 54:5 55:7,12,15,18,20 55:24 56:1 57:7 60:17 62:10 63:21 64:11 65:19 121:19 122:14 153:4,6 Mount 85:12 move 35:10 160:20 moved 16:4 153:15 movement 44:7,11 44:13,14 46:4,7,8 46:10,21,25 48:3 48:7 68:7,16 70:4 96:6,14 98:15 MSU 16:9 much 19:2 46:7 80:18 135:24 145:9 156:14 165:1 multiple 98:22 99:4 129:7 145:4,8 must 65:14 87:23 116:14 141:13 mutate 26:10 29:5,8 29:19 30:8 31:8 35:23 36:10 38:6 38:6,8 mutated 24:4 28:21 28:23 31:1 mutating 28:25 mutation 23:22 25:3 25:10,11 26:11,15 26:16,20 29:4,14 29:17 31:13 32:2 33:11,12,14 34:5 34:24 35:2 36:5 38:1 67:5 113:3 mutations 24:12 25:1,14 28:19 29:13 31:23 152:6 152:11 myself 4:12 16:25 50:13 mysterious 84:9	mystical 95:20 N N 3:1 4:5,5,8,8 170:3 name 4:13 6:11,13 43:16 65:6 87:3,4 namely 76:1 names 21:2 Nancy 90:19 national 39:10,18 43:7 natural 23:20 25:19 25:20 26:1,4,23 33:12 34:6,16,22 34:24,24 35:18,21 37:1,7 38:20,21 56:9,13,21 57:2,6 57:16 67:6 77:18 77:19,21 78:22,25 80:4,5,21 81:2,4 81:13 82:3 83:14 84:4,23 85:19,21 88:9,12,17,22 98:6 100:8,16,22 104:24 105:8 106:19 108:22 110:7 112:5,21 113:1,3,6 116:3,4 117:24 118:21 121:13 122:6 124:8 126:25 146:13,15,17,21 146:23 147:4,7,12 147:13,15 149:9 149:14,19 151:3 152:5 161:13 163:15,18 naturalism 93:17,19 93:25 94:7,13 96:3,9 97:22 105:6,11 106:5 109:7,12 113:9,22 114:3 117:12 121:12 124:23 125:7 153:16 154:22 155:10,19 156:8 159:19 165:2,4,7,16 166:6 167:14,19 167:24 naturalist 96:10 157:12 naturalists 137:14 137:15,21 naturally 30:10
--	--	---	---	--

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

14

33:15 35:3 36:14 38:15 140:6 nature 7:7 10:19 12:19,23,25 13:15 14:14 15:5 22:25 41:15,22 51:21 54:14 58:8,17 74:17 76:4 78:4,5 78:6,12 81:7,19 81:19,20 83:3 96:22 97:4,10 101:9 114:1,9 120:12,22 necessarily 15:2 109:24 112:17 113:21 115:25 149:6 159:3 necessary 31:24 61:6 70:1 71:7,10 71:21 75:20 necessity 112:23 116:3 157:20 need 5:4 9:3 18:5 40:5 96:21 97:9 124:5 131:2 152:7 needed 151:20 needs 94:15 96:9 120:6 negation 98:5 116:2 neo-Darwinian 39:6 137:8,11,24 138:2 138:6 neutral 105:15,21 107:2 never 63:22,24 114:12 124:5 139:9 146:2 new 16:3,7 28:19 29:6 38:1,22 90:24 120:13 122:16 128:22 129:21 133:10,14 138:13 news 22:6 newspaper 21:21 Newton 54:10,21 79:18 155:18,18 155:20,21 156:8 156:19,20 158:5,6 160:8 169:1,6,9 Newton's 54:23 55:8 64:24 79:19 169:12 next 6:19 126:5 130:17 136:1,2 nice 54:15 117:8	nineties 19:3 nods 5:3 nominal 46:14 nomological 9:14,21 9:24 nonetheless 104:10 nonexistence 62:2 non-biblical 160:17 non-Christian 158:23 160:18 non-natural 74:7,8 75:15 77:1 88:11 108:25,25 109:20 110:2 112:10 113:12 115:18,21 non-reality 71:2 non-science 52:19 52:21 53:1,3 non-standard 117:10 Nord 20:21 norms 117:11 Notary 170:23 171:3,25 note 73:9,10 85:6,8 85:9,9 87:9 notes 88:5 90:4,16 154:12 nothing 64:5,10 89:21 118:16,23 129:18 144:22 notice 64:19 117:16 notion 8:13 12:11 32:23 33:21 34:11 34:12 37:11 56:21 56:21,22 71:24 72:14 73:3 74:14 74:16 75:4 78:8 78:10 79:13 80:2 81:9,13 90:9 91:4 91:19,22 93:1 98:25 99:10 102:10 113:10 115:21 118:10,21 120:16 124:3 131:4,12,17 135:6 136:21 137:5 144:19 145:1,2,10 146:8 151:2 152:16 153:11 162:2 notions 13:11 14:4 105:18 129:23 152:22 Nowadays 159:7 nuances 145:6	nudged 156:6 number 3:13 23:6 25:22 28:3,10,16 28:20 29:11,12,20 29:22 32:7 33:25 36:3,4,9 37:19 44:2 45:24 46:17 48:22 125:17 158:8,18 161:15 numerous 36:15 n-o-m-i 9:23 N-o-m-o-l-o 9:24  O O 4:5,5,8 Oakland 171:2,19 object 9:1 11:23 17:18 37:2 47:24 52:22 59:1 64:7 123:12 155:14 159:20 167:17 objection 59:14 objective 73:3,4 91:17 objectively 70:20 72:25 73:6 objects 137:16 observability 103:18,19 observable 104:4 observation 49:10 101:17 103:24,25 104:8 109:14 130:23 136:3 161:11 observational 157:3 observations 134:22 135:8 160:25 observe 33:8,13 104:6,22 109:9 observed 104:10,15 104:20 111:22 142:5 observing 34:19 obviously 78:6 139:17 occasionally 139:7 152:3 occult 79:3,15,16,22 79:23 83:16,20,24 84:10 100:8,20 106:12,17 163:3 163:13 occur 19:19 28:19 occurred 148:1 occurs 28:17 32:3	36:17 odd 106:19 133:2 136:9 156:24 157:5 off 4:12 35:10 71:17 74:2,3 90:18 166:25 offer 84:5 100:8 offered 109:23 offering 168:1 offspring 24:5 27:5 36:14 often 25:1 71:1 92:9 99:1,16,24 111:5 121:2 135:8 oh 19:10 20:5 21:5 65:21 66:7 73:10 79:23 99:24 106:17 127:12,13 131:2 146:1 149:24 159:3 okay 9:19 10:3 11:10 13:23 18:7 19:18 22:16 30:14 35:25 41:1 53:5 56:16 59:5 62:8 66:1,3 72:8 73:16 85:11 89:2 90:13 107:15 117:14 119:7,14 124:20 127:8,17 136:1 142:13 143:7 148:23 149:1 153:25 165:14 167:13 old 75:8,11 146:5 once 25:24 78:24 83:16,20 94:16 103:9 141:7 147:17 one 2:5 4:14 7:12,12 7:20 8:20 9:18 10:8,11 12:18,21 13:2,5,12 14:8,18 15:23 16:3 19:22 20:6,9,21,21,23 22:3 24:14,25 25:9 26:17,21 27:6,7,12 28:25 29:6,8,14 31:13 33:5,24 35:11 37:5,20 38:1,2,4 39:10,11 40:4,6 40:14 41:20 42:14 45:6 47:13,13 50:15,21 51:25	52:11,13 53:10,25 55:14,16 57:10 61:17,18 62:8,25 63:14 64:12,22,22 65:12,17,25 68:18 70:19 71:4,16,17 71:17 72:9,17,18 73:22 74:18,19,25 75:3,7,9,9 79:14 79:17,18 82:16 83:6 84:18,24 85:1,1 86:16 87:15 90:6,17 92:17 93:25 94:4 94:14 95:12,24 97:17 98:25 99:15 99:17,19 100:2 101:5 102:1,9 103:1 104:3,14,18 105:19 106:2,4,6 106:7,9,16,17 107:10,13,15,21 107:21 108:19 109:2,5,9,11 110:10 111:18 112:12 114:5,5 120:3 123:10 126:24 127:3,4,11 127:13,21 128:4 129:15 133:1,24 134:7 135:13,14 136:22 137:12 138:15,23 140:11 141:6,6,7,25 143:9,10,10,20,24 144:23 145:5,9 147:14 148:4 149:25,25 150:2,5 150:10,19 151:7 153:5 156:1 157:14 160:6,13 162:14 164:5,7,14 164:16 165:11,19 165:19 167:20,22 168:1,12 169:8 ones 19:18 29:8 36:11,12,15 38:19 84:24 99:13 124:8 130:2 133:25 134:1 147:22 151:24 152:6 160:23,24 one's 52:7 84:7 168:17 only 19:22 34:19 38:5 54:2,3,21
---	--	--	--	---

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

15

102:6 105:7 112:9 115:18,19 146:4,6 on-the-street 131:6 open 105:11,12,16 105:19 106:7 107:9 126:16 130:12 161:22 164:5,20 opening 162:3 openness 105:2,4,11 105:18 opens 95:23 operate 120:16 operates 22:23 operation 28:4 146:15 147:13 opinion 4:19 12:1,9 18:18 33:9 49:6 49:20 52:21 56:8 61:12 69:1,12 72:11 74:11 75:18 85:20 93:17 95:8 96:19 97:15 98:9 98:10 100:10 101:14,19 105:1 107:5,17 108:2 110:9 113:9,21 114:4 124:21 132:2 134:24 141:2 142:22 148:7,15 161:21 162:20 opportunities 128:5 opportunity 37:12 opposed 13:16 62:23 146:14 147:17 opposite 131:20,24 opposites 131:7,8,9 oppress 6:4 Op-Eds 21:21 22:6 orality 68:19 orbits 160:7 161:4 order 50:2,2 71:12 71:21 75:21 165:9 ordered 31:3,4,13 ordering 142:9 ordinarily 121:5,8 ordinary 13:11,16 56:22 57:3,16 65:13 83:12,13,22 84:11 105:13 109:6 117:11,18 118:1,3,10 120:4 121:11 124:3,4 131:6,19 145:1	151:23 157:3 163:19 organism 24:8,10 25:4 26:11,15 27:4,6 28:18,19 30:25 31:22 38:1 115:4 organisms 18:13 22:21 23:2,9,24 24:3,19,23 25:21 25:23 26:3,10,24 28:16 32:9 35:20 35:22 36:6 37:22 66:19,23 67:10,12 127:1 137:19 141:19 145:11 149:10 organization 39:2,9 40:13 43:10,17,22 46:12 58:3 81:16 organizations 49:8 57:22,24 organized 42:1 oriented 43:2 origin 45:4,14,18 75:10 116:17 136:4,7,10,12,13 136:14,19 137:7 138:4,9,10 139:6 139:11,20 original 35:14,16 110:7 originate 67:23 origination 139:13 origins 45:20 138:17 139:23 other 8:15,19 9:17 19:9 21:2,3,4 24:1 24:1 25:10,23 26:3,24 28:24 29:6,8 32:6,9 33:15 36:12 37:6 37:7 38:13,15 40:16,20 41:21 42:18 47:7 52:15 52:16,20 55:23 60:11 61:5,11,13 65:19 67:6 69:2 75:11 76:13 77:17 81:18 84:24 85:17 86:11 87:22 89:22 92:22 94:2,20,23 95:3,8 98:16,17 99:9 103:9 105:20 106:9,22 108:24 110:19 111:13	112:8,14 113:24 114:21 115:18 118:8 121:13,18 121:22 122:3,6,6 122:19,20 123:21 124:7,11,14 127:23 129:5 130:7,12 132:21 135:4 138:24 140:3,9 141:21 143:20,22 144:2 147:1,22 148:4 149:16,22,25 150:24 151:8 152:16 153:12 154:18 166:15 169:13 others 26:5 35:23 46:9,15 67:25 68:1 95:4 103:6 104:23 141:20 158:22 otherwise 73:7 134:14 ought 133:7 152:14 166:3,18 ourselves 47:14 121:14 out 13:12,13,18,25 14:7,9,13 18:6 19:16 25:20 31:2 31:7 35:21 36:18 49:16,17 53:23 55:1 56:10,14 57:24 58:2 79:16 81:15,17 83:10,11 84:2 85:25 86:22 99:23 105:23 106:7,12,13 109:8 110:19 115:6 116:8,9 119:8 121:5 125:5,8 126:19 129:2,17 134:9 135:19,21 137:16,25 140:21 141:8 143:12 157:18 160:4,5,7 160:20 164:6 165:21 outside 26:12 76:3,3 78:6,10,11 81:19 107:1 109:22 112:14 150:20 154:9 169:14 out-compete 27:5 36:13	out-competing 38:19 over 38:11 44:22 102:15 112:25 126:5 128:1 138:1 140:22 overall 32:10,14 48:8 114:15 145:10 oversimplified 82:6 134:25 overtune 96:11 133:10,15 overwhelming 134:12 143:23 own 24:13 71:4 116:13 117:6 123:2 139:8 157:10 161:4 165:5  <b>P</b> P 4:5,5 170:3 package 114:7,7 packaged 13:25 packed 14:1 Padian 37:5 Padian's 140:25 142:18 page 3:3,13 41:11 41:12 44:8 46:1 49:3 53:17 57:19 60:15,16 69:9,14 70:3 71:8 73:9,10 80:12 85:6,9 87:9 88:13 96:16,17,21 97:23 98:2,4 100:6 101:10 103:11,21,23 116:12,20 126:5 128:20 136:1 161:9,14,16,18 paleontologist 141:18,24 paleontologists 142:10 paleontology 140:12,18 141:16 Pandas 19:1 21:16 22:5 116:11 paper 87:7 paragraph 49:4,5 57:18 80:14 96:17 97:25 101:11,13 101:16,18,21 103:23 116:12	128:20 134:21 136:2 161:10,18 161:24 paragraphs 125:24 125:25 128:19 parameters 24:16 24:23 25:18 27:23 paraphrasing 91:1 parent 42:16,18,21 42:25 43:5 part 14:17 15:15 22:13 25:4,24 28:9 40:1 49:2 53:10 61:20 62:5 63:2 70:1 75:17 78:3 79:5,24,24 79:25 83:1,2 88:2 95:2 97:2,3 98:22 100:16,18 101:8,9 105:16 106:8 109:20 115:18 116:22 127:22 130:25 137:10 138:12 139:3,7 146:2 154:3 157:23 163:15,18 166:6,7 168:6,21 168:23 169:7 particular 7:17 8:8 18:24 20:14 24:25 29:4 30:24 31:4 32:11 43:4 48:7 54:24 56:18 57:9 58:8 62:9 63:15 67:10 68:2 86:5 88:3 91:15,19,21 95:1,3 98:12,17 98:24 99:14 100:2 115:16 117:7 119:3 120:20,21 121:16 123:22 127:1,11 130:2,3 130:10 135:3 137:12 147:2,5,7 148:17 149:3 151:20 156:1 159:21 particularly 8:17 20:23 30:3 70:22 86:10 parties 171:14 parts 9:17 33:25 34:3 130:1 169:13 passage 156:24 passages 158:1 passed 37:14 41:14
--	--	--	--	---



ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

16

past 143:24 146:8 146:15 147:12 Pat 4:14 pathway 147:3 149:4 pathways 67:14 Patrick 2:10 21:24 pause 5:23 pay 99:15,25 Pearcey 90:19 Pearcey's 91:17 Pennock 1:18 3:5,16 4:10 6:13 35:10 44:12 52:17 59:10 60:21 66:12 75:17 81:20 87:25 96:16 103:17 110:4 116:18 125:19 130:22 148:9 154:16 170:13 Pennock's 163:1 Pennsylvania 1:2 2:6 people 19:1 39:7 45:11 46:12 48:24 55:21,22 76:13 78:5 118:8 122:7 132:18 138:17 152:3,23 156:5,14 159:5 160:16 167:2 peoples 121:25 people's 72:15 Pepper 2:4 per 30:23 91:15 139:4,6 percentage 25:2 perfectly 150:11 161:19 perform 27:21 31:5 31:12 115:5 149:13,16 performing 130:14 perhaps 16:21 45:25 81:16 107:7 108:14 152:18 155:4 period 22:9 79:2 125:1 158:22 159:18 person 54:4 55:17 65:1,4 86:25 107:12 117:23 118:7 135:17 152:18 167:4 persons 46:17 48:2	68:21 87:11 person's 53:11 55:18 perspective 82:10 154:20 161:7 pervasive 96:15 phenomena 84:6,6 104:9,15 106:15 111:22 135:6 Phillip 70:18 87:14 95:20 philosopher 10:15 16:25 50:15 73:22 107:12 146:7 167:7 philosophers 13:1 133:16 145:17 philosophical 12:22 135:12 philosophically 131:9 164:7 165:17 philosophy 10:11,13 12:18,20 14:4 15:12,14,19 23:4 78:16 105:17 116:15 124:3,6,16 125:11 146:3 164:2 phrase 68:2,24,25 128:1 phrasing 62:4 98:17 98:17 129:2 physical 77:23 78:7 78:8,12 79:5 81:21 82:3,8 83:4 88:23 96:23 97:5 97:11 104:8 113:13,14 116:4 158:19,20 physicalism 82:2 physics 159:5,9 Ph.D 1:18 3:5,16 142:18 picking 28:21 picture 91:24 138:16,16 place 6:16 25:16 38:11 41:19 44:17 80:4 88:8 102:22 120:12 131:2 156:1 169:11 placed 9:9 17:24 48:2 places 4:25 81:7 89:21 116:8	123:21,21 156:6 plain 14:15 15:1 17:23 plainly 21:9 28:7 140:10 plaintiffs 1:9 2:8 4:17 19:9,10 21:5 planetary 155:25 157:23 158:3 160:4 planets 156:4 157:23 169:3 planting 96:7 plants 137:17 Plaza 2:5 please 5:4,11,14 6:1 6:7,11 14:18 36:2 37:18 66:7 125:16 pliable 78:15,19 80:2 ply 78:18 point 15:1 18:5 20:6 20:9 21:6 24:6 34:17 42:21 47:7 53:8 54:16 60:8 62:9 66:12 86:16 87:25 88:25 89:24 89:25 90:6,13 99:23 105:6 113:7 113:7,12 114:10 118:24 119:14,20 119:23 121:15 122:9,11 123:25 124:6,18 125:4,5 127:11 129:2 132:23 134:4,12 135:7 148:13 153:21 156:10,22 159:21 160:15,24 161:11,19 162:10 162:11,18,19 164:4,10 169:11 pointed 79:16 110:19 119:8 121:5 156:10 pointing 49:15 62:12 91:5 99:8 102:2 119:4,17 124:2,15 125:12 points 36:23 48:7,14 48:22 62:1 119:2 156:2 policy 21:17,18 22:6 42:4 pondered 128:1 population 138:1	151:20 portion 60:10,12 116:10 123:1 140:20 posed 123:16 posing 118:16 posit 157:8 posited 8:3 144:8 positing 107:24 position 6:18 17:25 18:2 39:9 41:5 69:23 70:7 71:19 72:21,22 88:24 89:3,12 94:11 143:21 positions 47:4 48:21 72:16 74:25 126:21 posits 90:3 148:21 possession 156:11 possibilities 29:11 29:12,17 30:1,2 105:14,14 106:24 164:8 possibility 105:2,5,9 105:12,16 106:7 107:4,9,11,17 112:20 113:8 125:9 161:22 162:11,15 164:5 164:20 167:9 possible 26:14 29:13 68:4 88:8 102:10 102:11 136:23 possibly 29:9 152:1 posteriori 165:22 potentially 58:6 60:5 62:14 power 74:9,11,18 75:15,20 109:1 116:1 152:19 powers 93:8 96:20 105:9 107:22 118:23 156:15 practical 133:20 practice 101:23 precise 5:12 14:6 75:3 145:17 precisely 76:20 predates 75:7 predators 37:10,13 predecessor 8:9 predict 84:15,18 predominant 147:6 preferentially 38:21 preferred 145:24	preliminary 6:10 premise 97:1 premises 99:19 premium 5:1 9:9 preparation 19:4 20:7,7,8,17 22:4 65:8,16 93:6 prepare 18:17 preparing 18:25 22:4 presence 171:8 present 42:7 presented 52:23 53:2 108:10 preserves 57:6 president 41:7 press 3:17 125:22 presume 53:6 presumed 92:17 presumption 57:15 presuppositions 69:10 pretty 46:6 71:1 90:20 93:7,14 139:5 141:25 142:3,6 143:14 144:2 166:24 168:25 prevent 42:11 116:15 prevents 32:4 previous 7:19 8:13 70:3 106:1 previously 79:22 83:19 123:19 159:11 163:11 pre-causal-mecha... 8:25 pre-report 22:13 primarily 30:7 86:6 primary 9:17 18:19 61:18 155:22 Principia 156:2,24 158:8 principle 112:6 133:16 143:7 161:12 164:5 principles 81:17 prior 8:2 9:8 10:5 45:2 118:8 141:19 priori 14:16 15:2 165:4,8,11,16,17 165:19 166:4 probably 61:18 92:25 118:11,12 118:12
---	--	---	---	--



ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

17

problem 14:20 98:23 126:18 127:3,5,15,21 problematic 99:18 129:22 130:24 137:6 problems 110:19 126:13,15 procedure 168:2 procedures 102:16 167:23 proceeding 167:19 167:22 proceedings 5:16 process 4:21 5:7,9 5:25 24:5 26:9 28:9,17 31:22 32:21 34:22,24 35:1,18 38:20 67:8 84:11,19,24 88:22 112:10 113:6 115:18 116:3,5 146:17 151:5,6 152:21 156:17 166:8,12 167:21 processes 32:15,15 32:22 57:3,6 77:24 82:5,9 83:3 84:25 88:11,12,23 92:18,20 100:24 110:7 112:6,21 113:1,14 120:16 120:21,23 140:4 141:7 142:4,4,8 142:11 147:18 151:12 processing 27:9,10 27:19,20 processor 27:13 37:24 produce 33:15 34:2 36:25 88:9,12 112:7,9,21 113:14 115:19 produced 27:6 34:16 88:22 108:21 110:6 114:25 152:15 produces 36:9 producing 109:9 product 147:20 profession 10:10 13:7,11 16:22 168:20,22 professional 16:23	17:4,7 38:24 39:2 126:9 128:23 138:10 139:16 professionally 12:19 professor 6:19,21 16:6,8,10,11 18:2 professors 39:18 40:17 program 17:11 28:2 28:3 30:16 31:23 32:11 33:9 34:4 36:24 37:16 115:3 127:22 programmers 35:16 programs 39:17,18 program's 28:4 progressed 132:9 progressive 127:22 project 18:16 22:19 22:23,25 23:2 24:16 32:12,13,14 32:23 33:1 34:8,9 85:7,7,13,14,15 85:16,24 86:6,17 86:25 promoting 158:20 pronounce 152:20 proof 140:16 144:19 145:1 146:7,9 proper 14:13 65:8 65:15 95:16 142:9 properly 46:3 47:4 47:16 50:4,9 61:8 63:11 95:19 157:16 properties 30:13 31:17 77:23 81:15 82:4 100:20 104:5 106:12,18 163:3 property 80:16 81:3 81:6 108:9 111:4 112:3,7 163:13 proponent 50:10 51:11 70:9 71:13 71:22 proponents 11:8 47:22 48:13 61:25 68:8,14,22 87:11 126:20 proportions 138:1 proposed 11:3,21 12:2 66:18 proposition 110:1 propositions 52:11 56:5 61:19 70:5 70:11 72:1	prospective 102:14 protean 99:6 protocols 16:21 prove 116:23 144:20 146:4,10 163:23 proven 9:25 10:1 104:10,16 140:14 140:15 144:11,14 144:18,22 145:12 145:22,23 162:21 proves 89:16 90:15 146:2,10 provide 18:8 42:24 43:5 73:24 135:5 provided 19:8 provides 16:17 88:1 public 39:23 40:4 170:23 171:3,25 pulling 152:17 purport 11:4,5,22 12:4,5,9 25:18 114:1 115:14 136:7 purported 52:12 108:5,9 111:4,9 114:14 purportedly 109:3,4 purporting 12:12 111:6,7 purports 136:8 purpose 4:18 5:21 6:4 22:24 23:1 32:11,14 39:16 49:15 54:11 122:14 149:2,7,18 150:2,4,5,6,12,12 151:1,6 152:25 153:12 purposeful 150:6,19 purposefulness 148:17 149:21 150:3 purposeless 148:6 148:22,24 149:5 150:7,15,20 152:21 purposelessness 148:7,16,18 149:21 purposes 4:13 43:25 55:24 121:19 pursue 43:6 put 14:12 35:16 38:9,10 39:17 44:17 52:24 53:9	54:1 57:1 58:9,16 59:15 64:9 71:24 72:7 73:1 80:9,25 83:9 96:12 102:21 109:17 110:13 120:11 121:6 129:17 152:4 153:19 puts 54:23 108:13 109:18,19 110:1 putting 11:11,15 52:11 55:4 61:4 83:7 106:19 110:15 pyramids 117:20 P-e-n-n-o-c-k 6:13 p.m 66:8,10 169:17	140:9 147:6,8 151:25 154:18 169:16 quick 103:14 quickly 19:21 quite 22:15 82:1 84:17 93:2 96:13 120:7 123:22 135:20 138:5 157:18 quotation 70:17 quote 11:15 59:18 90:6 91:18 141:3 quoted 100:2 quoting 98:12  R R 4:5,5 170:3 radical 166:18 radio 86:6,8 random 23:21,22 24:9,11 28:3,10 28:15,18,20 32:7 33:11,12,13 34:5 34:24 35:1,3 36:3 36:4,9,9,21 38:1 67:4 113:3 randomize 102:10 randomized 101:22 102:13,20 141:4 randomly 24:4,6 28:20 35:23 36:17 38:16 103:2 151:3 randomness 28:1,1 28:8,9,10,15 112:24 116:3 range 46:12 47:3 48:12 74:24 75:5 92:22 94:3 95:5 99:12 132:19 134:22 135:3,8,14 150:21 rank 16:5 rare 139:5 rarely 132:10 rate 24:12,12 25:1 25:11 26:15,20 29:14 rates 26:16 rather 4:21 48:11 88:17 146:9 rational 166:2,11 rationality 162:17 ray 25:5 reach 57:13 119:14 reaching 125:8
---	--	--	---	--

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

18

read 14:24 19:2,4 19:16,17 30:17 50:12 53:17 62:4 66:13 89:8 96:4 97:2 readily 14:16 reading 17:2 18:21 21:22 140:25 reads 116:12 129:22 ready 154:16 real 23:16 27:3,15 70:21 72:25 73:6 100:5 realism 70:4,9,10,13 70:18 71:9,20,22 71:24 72:24 96:6 reality 70:21 71:2 73:3,4 81:21 91:17 realize 65:11,20,24 79:23 80:6 101:7 realized 100:23 really 13:12 14:13 19:17,24 23:5 31:9 40:17 48:18 60:4 61:15 67:19 67:24 79:5,23 94:24 99:21 107:10 112:5 113:4,18 118:18 130:2 133:13 135:23 139:3 150:7,22 153:10 156:24,25 157:6 157:11 160:8 162:7 163:16 164:13,19 166:18 166:19,22 167:12 realm 57:25 96:23 97:5,11 107:25 154:9 164:22 rearranged 38:11 reason 100:2 120:18 122:2 130:19 164:9 reasonable 150:12 161:20 reasoned 141:1 147:20 reasoning 93:20 120:9,10 157:11 165:16,17,18,23 166:1 reasons 152:2 162:13,14 166:2,3 166:10,19	reassess 65:9,10 rebuttal 19:5 20:22 recall 20:14 21:22 148:11 158:9 recategorization 84:4 receive 8:23 received 16:1 recent 41:17 75:10 recess 35:8 103:15 154:14 recessed 66:8 recognize 10:25 133:4 156:16 recognizing 46:15 recollection 163:1 recommendation 90:23 record 4:12,13,25 5:21 6:12 14:25 30:20 50:14 59:7 62:7 74:2,3 142:10 recorded 70:22 recourse 109:24 112:18 reduced 171:8 refer 23:17 44:6 46:14 61:14 66:16 73:16 74:5 155:5 reference 8:21 14:15 46:1 47:10 55:21 80:13 85:7 85:12 90:5 101:10 101:11 116:11 127:23 referenced 17:1 25:18 references 90:17 referred 45:20 46:9 120:8 referring 23:18,19 24:18 30:19,21 33:20 45:10 68:15 77:22 80:24 81:21 82:9 85:10 101:21 120:24 refers 66:17 78:2 reflect 68:7 reflection 52:6 refresh 20:15 refreshed 19:3 regard 13:15 18:20 18:25 30:18 34:21 43:20 47:12,15 48:7 54:24 55:24	56:4 86:17 88:3 90:9 92:8 93:9 94:24 102:23 103:19 105:21 107:3 111:13,24 121:18 122:23 125:4,4 126:23 128:2,6 129:1 130:9 133:14 134:4 141:17 142:24 145:7 147:6 152:15 153:6 157:7 160:11 163:2 166:15 regarded 78:24,25 83:10 134:17 161:23 regards 137:3 regularities 84:25 100:19 regularity 83:21 regularly 98:21 117:23 142:10 156:2 REHM 1:5 reinterpret 65:23 reject 75:14 77:16 95:3 96:3 97:1,16 97:17,19 114:7 rejected 94:9,21,23 95:9 rejecting 76:25 97:21 113:18 128:12 164:4 rejection 62:18 74:6 76:1 113:13 114:16 125:13 rejections 95:25 rejects 8:18 110:23 110:25 112:20 relate 60:23 67:9 131:22 related 10:21 21:13 34:12 38:3 67:3 67:11,14 70:11 81:24 109:15 145:11 160:24 relates 7:5 33:1 60:11 84:20 131:21 140:12 relation 8:4,4,6 71:5 relations 96:24 97:12 relationship 7:18,20 7:23,23,24,25	8:15,16,17,18,21 8:24 9:16,17 10:19 13:13 55:2 55:23 61:23 71:7 76:5 84:16 102:9 103:8 104:4 relationships 13:9 61:21 67:2 97:6 102:4,7 104:23 140:22 relative 38:13,17 release 3:17 125:22 relegated 84:9 relevant 31:9 49:21 50:20 51:8,24 52:1 54:17,20 55:5 57:17 58:4,6 58:12,19,24 59:11 59:25 60:25 61:5 61:7,11,14 62:2 62:13 94:5 131:13 reliance 96:19 religion 74:21 91:13 91:15 92:2,3,6,8 92:11,25 93:2,4,5 93:11,12,15 105:17 107:19,22 107:25 116:15 124:2,6,15 125:11 religious 49:7,8,12 49:24 51:3,12,18 52:3 53:19 55:7 56:1 57:21,23 58:3,4,21,23 59:11,19 60:17 61:7,9 62:11 64:11 65:7 91:6,8 92:12 107:18 158:15 160:14 162:11,13,18 religiously 150:5 rely 61:1 remain 164:22 remember 20:3 148:12 158:13 remind 21:2 45:15 remove 34:2 removing 162:4 Renaissance 1:21 render 18:18 repeated 14:25 30:20 50:14 59:7 62:7 rephrase 5:12 9:2 110:14 163:9 replace 28:24 29:9	replaced 25:9 replaces 24:7 replicate 25:25 30:5 30:25 31:3 32:6 38:10,17,18 149:13,15 replicates 38:8 replicating 27:4 32:5 replication 24:5 25:2,3 28:17 30:2 38:22 replicators 35:2 report 3:15 18:11 19:1,15 20:6,12 21:2,19 22:4,9 32:22 41:10 44:1 44:6 45:24 46:16 49:3 53:17 57:19 60:10,12,20,23 67:20 69:9 73:9 80:13 85:6 88:13 90:5,12 93:6 95:21 96:16 100:6 103:18 114:19 116:11 140:11,25 140:25 154:19 155:20 161:10 reporter 1:23 4:24 171:3,24 reports 19:5,6,8,17 19:24 20:2,3,10 20:19,22 21:4,15 21:21 22:6,11,12 66:14 148:6 reproduce 26:6 36:16 149:20 repudiate 72:9 repudiation 113:21 require 9:11 94:24 108:24 165:23 requires 27:9 33:25 48:5 101:17 103:23 research 17:14,14 18:12 22:20 23:3 39:7 45:20 49:1 90:4 126:17 127:3 127:4,6,16,22 129:24 130:13 138:3,18 139:23 140:8 147:8 155:22 166:13 researchers 32:20 138:11 researching 18:22
---	---	---	--	---

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

19

57:2 reservation 130:20 130:21 reservations 10:25 resolve 130:8 resources 42:25 respect 12:7 46:19 109:14 151:12 respecting 125:6 respond 5:2 41:25 124:14 responding 57:9 response 40:5,8 111:25 responses 5:1 responsible 75:21 rest 75:14 115:17 161:24 restated 90:8 restricted 96:23 97:4,11 restricting 161:12 result 114:21 139:13 144:24 147:4 165:16 results 121:6 resumed 66:10 retained 19:9 20:2 20:19 retrospective 102:14 reveal 64:14 revealing 58:8 64:1 Revelation 158:17 review 21:15 22:12 reviewed 19:6 reviewing 93:5 revised 110:16 revision 110:18,21 revolution 95:12 right 6:3 11:9 16:12 22:14,15 30:6,7 30:14,14,18 31:6 34:1 43:9 55:19 56:12,15,20 68:17 68:18 80:6,10 82:1 106:6 111:14 116:6,21 117:4 122:23 134:19 135:7,18 152:15 156:6 160:11 165:24 rise 127:20 Robert 1:18 3:5,16 6:13 170:13 Rochester 41:21	42:6,13,19,23 rock 141:18,23 role 46:9 Roman 44:8 root 145:7 159:2 roots 145:8 rule 53:23 56:10,14 57:24 58:2 105:23 rules 94:13,14 106:7 run 33:17 Rushmore 85:12  S S 3:11 170:3 sacred 95:19 sake 48:17 salary 39:24 41:8 43:23 Salmon's 7:11 same 5:13 12:7,11 26:2 29:21 31:15 34:8 42:17 55:20 56:2 58:6,14 59:14 80:2,8 81:17,17 95:11 104:24,25 106:1 107:8,10 109:12 111:7,25 112:11 120:14,15 121:23 126:18 127:14 143:8 147:14,22 149:14 151:13 159:4,14 161:5 163:20 saying 17:12 47:18 50:3 53:18 63:2 63:21 68:18 76:22 76:25 83:1,15 88:25 91:13,23 96:5 102:19 106:8 108:14 109:18 114:18 120:18 121:18 122:2 124:16,20 125:4 126:18 127:14 134:16 152:24 153:19 162:18 163:12 164:2,14 167:23 168:2 says 7:16,21 18:6 24:25 33:4,7 34:15 70:18 76:11 89:21 90:6 95:22 97:9 106:9 108:19 108:20,24 110:8 112:2 117:16	119:3 156:3,5 157:1,7,7,17 164:8 166:1 167:5 scan 86:7 scattershot 151:23 152:12 scenario 55:8 scenarios 27:24 SCHMIDT 2:3 9:1 11:7,10,23 17:18 21:24 22:2 32:12 35:7 37:2 47:24 50:12 51:19 52:22 53:2,5 59:1,14 64:7 66:6 74:2 82:14 91:10 98:1 103:11 123:6,12 125:25 128:4 148:9 154:11,24 155:14 159:20 162:22,25 167:17 scholarly 21:10 school 1:12,12 41:12,20 52:15 158:7 schools 44:19 science 10:11,13,15 12:18,21,23 13:1 13:6 14:4 15:14 15:20,22,23 17:2 17:10,14,22,25 18:8 22:19 23:4 34:9 39:22 40:12 41:2,3,6 42:3,5,5 43:3 44:17 45:5 45:14,18 51:9,16 52:12,19,21 53:1 53:2,12,12,13,13 53:24 54:13 55:11 56:11,14 57:25 58:2 61:8 62:3 63:9,17 64:4 66:1 69:6 70:22 72:25 73:6 77:22 78:16 79:4,4 82:12,17 82:19,20,21,23,25 83:15 84:3,19 86:1 89:16 90:1 90:14,24 91:7 92:3,6,8,12,15,24 93:16,18,21,22,23 94:2,3,8,13,16,21 94:23 95:1,14 96:1 100:11,13 101:9,15,20 102:17 103:18,20	104:9 105:7,15,17 106:9,10,14 107:13 109:3,21 109:22 112:5,15 114:8,17 115:3 116:13,16,23 117:2,6,22,25 118:16 119:13 120:9 122:20,20 123:2,17 133:6,17 144:22 145:1 146:2,3,4,7,10 152:20,24 153:2,9 153:13,24 154:9 154:22 155:8,23 156:16,18 157:19 159:18 161:22 163:10 164:2,2 165:6,10 166:6,21 166:21 168:18,23 169:7,10,15 scientific 7:7,11,15 7:16,22 9:8,25 12:20 13:7,15 14:1 18:11 39:2 49:13 50:1,10,22 51:2,10,17 52:5 54:10 56:22 57:3 58:5,23,25 59:13 62:23 63:12,23 64:15 65:1,3,24 74:6 76:11,25 77:14 83:12,22 84:7 85:21 86:1,2 86:3,3,12 91:6 92:13,14 93:20 95:9 96:21 97:8 97:14 100:14 101:14 102:1,2 105:25 107:6 108:3,3,11,16 109:6 111:2,24 113:17,18 117:11 122:9,22,25 123:4 123:11 124:12,22 124:25 125:14 126:22 127:18 128:10,16 129:11 130:11,12 131:12 131:17,21,24 132:2,3 136:21 137:1,5,12 139:10 140:16 144:16 145:14 153:11 154:5 156:21 159:17 160:2,24	161:8,12 162:19 166:8 167:1,6 168:6,7,7,10 169:13 scientifically 10:16 131:8 133:4 134:8 144:18 167:15,21 167:22 168:5 169:2 scientific/not 50:22 scientist 17:8,13,16 49:25 51:18 52:19 52:21 53:23 55:5 55:12,16,18 57:8 127:12 153:6 157:15,16 165:5,9 169:1 scientists 10:12,17 14:5 27:22 57:4 66:19 84:5 117:13 126:14 129:25 134:11 145:25 146:1,5 151:10 156:21 166:8 scope 149:1,2 Scott 89:2 scrutiny 13:21 se 30:23 91:15 139:4 139:6 search 57:15 85:15 second 5:7 35:6 52:25 59:20 62:5 82:16 101:10,12 101:16 104:14 109:15,17 111:20 128:20 134:20 section 60:13,20,22 61:2 100:10 secure 43:2 see 9:5 11:6 15:7 20:25 21:6 31:20 33:17 37:4 43:7 44:11 45:1 51:1 52:7 53:17 54:9 54:18 56:4,12 58:21,23 59:11 63:20 67:12,20 72:6,12 73:5,18 76:17,20 77:4 83:16 85:16 88:10 88:14 92:5,6 97:7 98:7 99:19 100:15 103:5 110:18 114:18 115:4,5 119:14 120:12 124:11,13 125:10
--	--	---	---	--



ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

20

125:23 136:2	31:5 38:12 41:15	27:19 29:8,23	120:10 124:13	164:6
138:24 141:12,12	44:10 46:2,10	30:6,7,14,15,18	125:5,12 152:5	somehow 8:24 68:3
147:15,25,25	52:2 57:3,16	30:22,23 31:6,7,8	154:7 164:7	78:9 88:18 165:23
157:9 161:9 164:9	59:21 63:14 65:13	35:12,14,17,20	165:20 168:6	someone 27:16,18
165:9,24 167:2,3	73:14,17 76:16,25	100:13 129:13	simulate 30:12	36:13 38:18 50:3
seeing 87:21 158:13	77:21 78:7 82:1,7	131:22 147:24	31:16	59:17 62:15 63:1
seek 158:15	82:25 86:23 90:10	153:1 171:18	since 86:24 132:9	65:16 72:13,16
seem 57:10 162:1	94:1 95:7 99:4,19	Seth 87:3	single 145:7 167:4	117:13,19,20,20
167:7	99:21,23 100:3,13	SETI 85:7,12,14,15	sit 110:20 158:6	118:10 139:6
seemed 89:4	101:3,13 102:19	85:24 86:5,17,25	site 25:2 29:4 39:20	152:17,25 153:22
seems 12:15 13:25	103:7,25 104:8	sets 29:15 103:3	situation 42:13	162:17 164:6,10
16:18 17:16 27:22	105:10,12 106:4	setting 23:8	59:24 103:8	164:12,16,19,20
32:22 45:10 46:16	106:22 107:2,9,24	settings 129:3	six 75:10	something 7:16,24
47:20 48:2,20	109:6,10 115:7,10	setup 102:25	skeptical 164:21	7:24 8:14 9:3
49:11 53:6 78:14	115:11 117:18	several 123:19	skimmed 19:10 20:6	10:17,18 11:16
78:21,24 84:13	118:4 124:1 125:2	136:9	slide 151:7	12:5,12 13:3,4,5
93:14 96:15 97:7	127:21 128:12	shake 156:22	sliding 98:25	13:10 20:14 21:25
102:5 105:5 110:1	129:14,15,18,19	shape 159:12	slightly 139:25	25:4 27:16 29:14
114:19 119:22	129:23 130:11	shed 50:7 61:9	ships 157:14	35:24 36:12 37:22
136:15 140:15	131:14,19,21	143:19	slow 38:17	51:9,14,15 53:7
142:22 144:6	132:2 135:5,6	shift 45:2 166:18	slower 32:6 38:9,13	54:4,6 55:10 58:9
145:13 152:10	136:23 137:14,15	shifted 44:22,25	SMITH 1:7	58:14,15,17,19
165:3	138:15 139:24	shifting 129:22	SNEATH 1:6	59:2 62:8,20 64:2
seen 84:10 100:21	140:14 144:16,16	short 35:8 64:19	society 38:25 39:1,7	64:19 65:14,22
115:9 125:19	144:20,23 145:13	103:15 154:14	40:21 139:4	71:25 72:4 75:18
137:4 166:24	146:9,10,11,22	Shorthand 171:24	software 24:2	76:2,3 77:19
sees 85:1	147:10 149:17,19	Shotack 87:3	soliciting 43:19	79:18 80:1,1,5
select 38:22	149:20 150:4,4,7	show 73:2 79:18	some 4:19,22 5:10	81:6 82:13,19,23
selected 27:11 30:10	150:12,13 151:23	114:12 117:8	7:1 10:25 17:1	83:6,7,8,9,16,19
33:15 35:3 36:14	152:12,13 156:7,9	144:20 166:20	19:5,6 22:23	83:21 84:9,18,19
36:16 38:15	157:18 160:25	showing 34:18	24:12 26:4 29:4,5	86:24 87:13,21
selecting 149:9	161:25 162:13	91:12,16,17	32:8 35:23 38:23	88:1,9 91:2 95:22
selection 23:20	163:14 167:2,13	137:20	39:20,23 40:5,16	100:12,14,16,21
25:19,20 26:1,4	168:3,5,12,15,19	shown 114:15 115:1	45:4,7,8 50:18	101:2 104:21
26:23 33:12 34:6	168:20 169:4,13	shows 33:9 34:19	54:1,16,17 58:2	107:5 109:3,4
34:25 35:18,21	senses 131:24	72:25 73:6 91:7	59:19 65:18 66:13	112:2,14 113:10
37:1,7 38:20,21	sensitivity 6:8	sickness 156:13	67:25 68:5 69:16	113:25 117:14,19
67:6 104:24 113:3	sentence 8:14,15	side 19:7 112:8	74:7,7 75:15 76:5	117:24 118:6,9
126:25 146:13,15	49:5 73:9 96:20	sides 153:5	78:10,13,22,24	122:15,16,17,24
146:17,21,23	97:2,7,8,23,24	signal 86:8,9,10,19	79:15 88:10 89:20	123:18 124:5
147:4,7,12,13,15	98:4,12 119:3	86:20	93:12 95:15 99:7	127:7,19 129:3,17
149:9 151:4	123:15 129:6	significance 49:10	104:22 108:25	131:4 133:5,6
self 35:2	130:19,25 136:9	signs 71:16	109:19,20 110:24	134:9 136:14
self-replicate 24:3	sentences 7:21	similar 37:21 42:14	110:25 112:9,10	139:16 140:4,19
37:22 38:5,7	117:8	143:17 144:15	116:7 121:20,21	141:24 142:1,2,5
self-replicates 28:18	Separation 43:8	similarly 70:4	121:24 122:8,15	144:17,20 145:22
self-replication 38:4	sequence 24:3 29:1	120:15	123:23 126:9	149:12 151:15
self-replicators	30:24 31:1,12,13	simple 50:21 86:19	130:1,4 132:11	152:19 153:4,16
33:14	37:24,25	141:21,25 151:2	133:8,8,10,12,21	153:21 154:3
seminar 158:6	serve 36:5	simplest 37:20	134:16 139:1	156:2 158:22
sense 4:20 5:20 6:25	served 39:12	simply 15:4 27:3	140:9 142:13	161:14 162:6
7:3 14:8 15:9,10	serves 15:24	28:3 31:17 36:9	143:22 144:23	163:12,17 164:1
15:25 18:16 20:16	serving 43:11	36:10 42:24 49:15	148:5 149:3,4,5	165:17,21,25
21:12 23:14 26:6	set 23:24 24:11,12	57:14 71:12 77:5	149:16 151:25	167:20 168:4,13
26:8 27:7,8,14	24:17 25:7,8,8,11	78:10 82:6 93:1	152:1,5 158:1,15	168:16,22
29:24 30:4,11	25:13 26:14 27:12	109:2 112:12	159:5 161:7,8	sometimes 5:22 13:9



ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

21

45:5,6 46:13 50:5 63:25 66:14,25 70:19 78:5 81:23 93:8 96:12,13 99:3 102:9,11,12 112:22,23 116:8 120:11,20 137:9 139:23 144:19 146:1,5 151:10 somewhat 5:10,13 28:14 44:22,25 80:19 139:17 sorry 21:1 35:25 73:11 79:9 85:8 98:2 119:19 146:25 161:14 sort 8:22 17:3 40:10 50:21 52:10 67:13 67:18 69:10,18 72:14 78:4 88:10 88:10 95:11,24 99:12,23 100:7 103:17 104:8 105:18 106:19 107:24 118:5 120:4,8 121:2 125:10 128:10 129:6 130:19 131:14 132:5 133:2,20 134:25 137:3,3,8 138:7 138:11,24 139:12 139:21,25 140:13 140:20 141:1 144:5,23 146:18 147:5 149:1 152:7 153:17 154:19 156:24 157:3,13 158:23 159:1 160:9,11 162:16 163:20,23 164:11 165:4,8 168:6,11 sorts 48:25 52:12 103:9 117:22 118:7,13 133:20 138:7 142:11 143:17 147:8 157:5 sought 56:8,12 sound 43:3 152:23 166:19 sounds 5:3 9:2 19:24 134:15 156:19 source 86:20 89:25 90:14	so-called 111:8 space 27:7 78:10 speak 75:8 139:6 speaker 153:15 speaking 39:1 40:8 42:22 44:11 64:24 65:3,5,13 122:21 145:24 153:7 speaks 32:23 34:9 specialist 158:5,7 species 136:13 138:13 139:20 140:22 146:14 147:12 specific 31:12 32:18 37:5,25 45:19,23 45:23 48:6,14,22 50:17 54:8,15 62:15 67:17 73:19 74:12,13,17 78:23 78:23 89:22 90:5 90:17 92:4,10 94:25,25 96:22 97:4,9 99:7 122:18 126:23 138:3 161:6 specifically 18:25 30:12 50:23 60:4 86:22 89:8 113:4 122:21 132:11 136:10 138:4 140:2 144:13 148:23 specifies 54:18 67:8 75:1 137:10 specified 12:8,11 34:10,11,14 111:1 111:5,19 112:3,21 113:15 114:11 speeches 47:12 spell 6:11 13:13 spelling 87:4 spend 167:9 spent 158:16,18 spirit 167:12 spiritual 65:8 162:10,13 spooky 83:13 spot 157:5 square 65:25 stage 27:22 142:20 stake 96:8 standard 37:9 71:1 76:16 86:1,2 87:13 93:5,7,14 101:23 102:3,6,20	140:16 141:4 166:24 168:20,21 standardly 93:4 standards 86:3 standpoint 145:14 star 86:7 start 18:19 25:24 51:7 126:7 started 138:17 139:22 starting 39:14 167:3 starts 128:21 state 6:11,17 16:4 23:3 40:16 41:18 43:8 52:7 57:11 171:1,19 stated 46:22 statement 88:14 118:15 123:8,25 126:8 131:17 136:3 statements 61:21 states 1:1 54:5 65:19 95:20 statistical 103:4 status 130:3 136:20 stayed 80:8 staying 106:4 stenography 171:9 stepped 109:22 stepping 112:14 STEVEN 1:6 sticking 153:10 still 47:7 72:10 75:14,14 77:14 78:8 80:4 114:14 124:18 130:7 135:21 140:8 145:9 152:3 161:3 161:4 167:8 168:17 stone 117:21 stop 126:12 stops 115:6 story 115:17 STOUGH 1:6 straightforward 104:2 168:25 strand 137:12,13,20 strata 141:18,23 strength 102:18 145:15 146:12 strictly 29:3 string 29:3 strings 152:17 strive 5:5	strong 144:2 145:4 166:19 structure 67:16 78:3,11,12 79:6 79:25 83:2 84:1 100:18 101:6,7 107:1 163:19 165:20 struggling 14:21 61:23 stuck 144:4 students 23:5 39:22 126:6,10 studied 84:11 139:20 studies 121:24 138:10 study 32:14 38:25 40:22 102:14 122:20 138:10 139:4 studying 14:1 26:19 stuff 82:8 subject 5:13 7:4 9:6 10:24 13:21 14:22 40:10 103:1 subjected 67:5 subjective 53:22 63:8,10,21 64:5 64:10 subjects 103:1 subscribe 39:6 Subscribed 170:18 substantial 21:10 substantive 49:9 successfully 28:18 sufficient 17:23 49:19 57:24 58:1 58:11 63:14,22,24 121:17 132:23 157:8 sufficiently 144:18 suggestion 164:16 suggestions 95:15 suggests 95:23 sun 156:4 160:12,15 169:3 Sunset 6:15 super 78:4 supernatural 74:18 75:1 76:2 77:2,18 77:25 78:2,22,25 81:2 82:12,13,17 82:19,21,22,24,25 83:5,10,13,16,17 83:25,25 84:4	85:19 87:10,17 88:17 93:8 96:19 100:16,21 101:2 105:2,9,24 106:13 106:14,18,25 107:5,16,22 109:25 112:18 113:8 118:22 136:25 152:19 154:7 156:15 161:23 162:4,12 162:20 163:10,13 163:16,21 164:3 166:22 167:3 superposition 141:25 superselected 151:24 supervenient 80:15 81:5 support 42:4 43:21 89:5,10 131:11 144:13 145:3,4 supported 91:24 123:23 137:21 suppose 111:17,20 114:22 sure 9:5 12:1 20:8 30:18 34:23 39:5 47:5 49:9,23 51:22 64:21 85:2 87:4 90:20 103:14 105:4,10,20 110:16 112:16 119:17 128:14 134:15 143:1 survival 26:3 27:3 survive 26:6 36:15 149:20 susceptible 47:21 swiftness 37:14 switch 99:10 sworn 170:18 171:7 symbols 117:15,21 synthesis 39:6 137:8 137:11,24 138:2,6 system 23:7,7,10,12 23:13,22,24 24:2 25:20 26:1 27:23 33:3,4,5,24 34:19 35:17 36:22 102:22,23 108:21 109:8 114:24 149:12 151:19 systematic 13:8 14:6 15:4
--	---	--	---	--

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

22

systems 23:11 33:5 33:7,10 34:5,18 34:21 86:7 88:21 88:22 102:22 108:24 110:6 114:9 115:1 <b>S-h-o-t-a-c-k</b> 87:3	tangibly 70:21 tantamount 73:5 target 96:13 task 31:12 taught 16:2 18:10 teach 18:9 39:19 47:13 teacher 42:14 teachers 39:19 42:2 42:7 teaches 47:13 teaching 44:16 team 23:2,3 27:22 28:7 tense 13:12,18,24 teasing 14:6 technical 99:25 168:19 technically 13:3 telescopes 86:7 tell 4:6 22:22 56:24 58:9,17 64:3 78:18 86:14 112:13 130:22 143:20 153:14 171:7 telling 152:24 tells 56:4 131:2 149:18 tend 5:23 tends 5:8 tenets 69:18 term 7:9,12 12:15 13:1 14:7,8 45:18 45:19 58:1 60:1 65:13 66:15 67:20 67:23 68:1,11,14 73:8,15 75:23 76:10,13,16,16 77:5,21,25 78:4 80:20 82:2 87:17 92:1 93:25 98:20 98:21 99:6,8,16 99:17 100:4 101:3 105:4 106:16 118:4,18 128:15 129:7 131:21,25 132:2 139:25 144:6,13 145:12 145:19,21 148:5,9 148:12 151:15 165:11,11 168:11 168:12 169:13 terminology 44:22 44:23,25 45:1,3 60:19 65:2 113:17	145:25 terms 10:23 11:1 12:24 18:7 19:23 20:2,18 21:21 25:17 26:23 28:23 30:13 31:25 35:12 35:18 45:8,11,13 45:22 52:6 54:2 58:20 60:11,13 61:4,10,17,19,20 61:20 66:13 69:8 70:7,20 75:7,13 80:12 81:1,23 85:18 92:1 93:16 95:6 96:5,12 102:18 106:20 110:2 112:22,23 112:24 113:3 117:10 120:11 124:3 125:6 128:16,23 131:20 140:15 145:10 148:4 161:1 terrible 80:25 test 23:7 32:15,19 85:3 100:23 101:5 102:25 104:3 109:8 129:25 143:16 146:20,21 150:13,13 162:3,5 163:10,25 168:1 testability 100:7,9 testable 79:20 83:21 142:23,24 143:5,8 144:5,6,9,10 146:23 147:11 149:19 150:20 tested 104:3,4 128:22 129:14,21 130:6 131:10 132:21 141:6,10 142:5,14 144:19 147:13,14 148:8 148:16 163:14,16 testified 4:7 testimony 68:12 171:6,7,10 testing 102:24 104:5 tests 130:14 143:17 152:9 Texas 16:2 taxonomy 137:18 text 19:1 116:12 123:2 textbook 134:5 139:1	thank 5:7 8:11 9:15 22:16 79:11 80:18 108:18 their 36:6,14 38:17 39:19,22 42:8 46:9,19,22,22 47:3 49:7,9 50:4,4 52:4 53:23 54:5,5 61:20 62:16,19 63:2,3,6,9,11 64:10,11,11,11 65:18,19,22 68:18 68:20 69:23 71:4 75:14 87:5,5 92:8 92:9,9 94:11,19 95:12 96:5,7,9,13 98:14,22,23 99:1 113:10,19,19 114:2,7 117:17 120:5 121:19 122:14 139:8 142:12,13 149:10 153:6 154:3 156:22 167:10 171:14 theistic 57:10 69:6 70:4,9,10,13,18 71:8,20,22,24 72:24 76:7,8,10 76:13 77:8,12,13 94:16 96:6 166:20 theme 96:4,5 themselves 10:22 46:14 47:9,11 63:22 68:9,13,21 68:22 69:1,3 89:15 94:12 139:22 151:5,11 theologians 91:23 theoretical 152:2 theories 8:19 17:3 127:23 131:9 135:5 159:17 theorist 70:1 115:15 theorists 69:4 77:16 80:14 89:15 94:22 95:10 96:2 97:1 97:16,18 98:11 100:4 164:24 theory 7:13 8:8 9:20 10:1,2,4,5,7,8,9 10:10,25 11:3,4,5 11:12,12,16,18,19 11:21 12:2,6,13 12:15,21 13:4 40:2 44:18,20,21	44:23 45:2 46:18 47:20,23 48:4,13 49:13 50:9,11 51:2,10,17 55:6 56:11 58:5,21,22 61:7 62:23 66:24 68:8,14 69:13,19 71:13 72:10 73:18 76:21 77:4,9 84:15,22 87:6 88:15 90:1,8,15 91:6 98:5 104:19 105:2,3 107:6,6 107:17,18 108:3,7 108:11 109:19 110:24 111:2,3,19 111:24 113:16 114:6 115:16 126:11,13,18,21 126:24 127:5,9,15 127:18 128:2,3,7 128:11,11,16,21 128:21,24,25 129:3,4,7,9,10,11 129:12,12,15,16 129:16,19 130:1 130:12,23,25 131:4,5,11,17,18 131:20,21 132:1,4 132:6,10,12,24 133:1,3,3,11,12 133:23 134:20,21 134:23 135:1 136:16 137:7 138:7,20 139:4 140:12 142:19 145:19 149:18 155:25 159:25 160:1,1,2 theory's 84:18 thesis 50:2,8 66:25 144:12 thing 10:8 23:16 31:11 35:11 36:23 40:6 50:17 88:11 95:11 100:19 102:1 107:15,25 108:20,24 111:4 126:18 127:14 129:1 136:18 143:13 146:18 149:14 159:1,14 things 14:11 15:3 21:22 22:7 32:2 36:16,20,20,22 37:7 38:2 39:23
---	---	---	---	--

ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

23

44:4 47:10,18 49:17 50:5,24 55:21,22,23 58:7 63:6 64:12 65:19 72:4,19 78:2,24 79:2,5,14,15,16 81:18 82:25 85:1 87:22 89:23 92:5 92:22 93:1,3,12 93:24 94:23 95:2 95:4,5,24 100:15 105:8,13 106:8,25 108:14 109:1,10 111:13 114:10,22 121:21,22,24 122:3,4,15 132:11 132:16,19 133:2,8 133:12,20,21 134:25 135:4,4 136:9 138:7,23,25 143:16 144:5 145:8 146:10 148:5 149:10 150:16 157:2,4,5 159:14 161:2,6,7 168:2 think 6:6 11:11 18:5 19:22 22:3,5,13 25:5 30:21 32:10 36:1,3 37:9 40:8 41:11 43:14,16,16 45:24 49:20,24 50:3,9,16,18,21 52:1,13,16 55:20 59:20,23 60:7 61:6 62:5 63:13 64:25 65:3,15 66:3 73:7 75:15 75:17 79:21 80:7 82:2 83:15,24,24 87:3,22 88:7,9 89:1 90:11 91:9 91:12 93:22 95:20 99:17 100:12 102:5 104:11 106:1,20,22 107:15 108:1 110:14 111:15 118:21 124:10 125:3 126:12,15 127:12 130:16 133:22 134:12 139:18 148:12 149:6 150:1 152:2 153:20 154:24,25 156:20,21 157:16	158:12,24 159:7,9 159:14 160:13,15 160:19 161:5,6,24 162:6,14,18,24 164:21,25 166:2 167:8 168:21,24 169:8 thinking 59:22 79:20 97:3 118:13 134:7 136:16 160:14 169:12,14 thinks 11:8 109:5 150:5 156:3 third 97:24 Thomas 2:3,11 though 17:13 57:10 58:10 60:24 64:10 78:9 90:12 93:13 99:2 102:1 106:6 114:15 129:25 130:4 135:20 150:14 152:10,23 169:1 thought 7:19 65:24 76:22 79:14,22 80:5 83:16,20 100:21 101:2 102:17 123:15 146:3 159:13 160:16 162:25 163:2 threatened 37:10 three 132:17 three-word 68:24 68:25 thrive 32:1 36:6 through 19:10,14 19:18,20,21 20:6 31:22 34:22 37:25 43:23 45:13 70:8 84:19 86:6 94:24 101:18 130:1 149:4 158:7,16 161:5 167:1 throughout 70:6 thrust 102:6 time 1:20 6:1 14:18 20:8 27:9,10,13 27:13,19,20 31:14 38:11,12 49:22 78:10,23 79:15 102:15 103:12 104:17 112:25 119:13 123:11 124:14 125:1 126:14 127:11,19	138:1 140:23 141:19 142:25 158:17,18 159:4 160:16 161:23 169:6 times 69:7 123:19 title 18:3,4 today 4:17 6:4 22:9 67:22 110:9,20 128:17 155:24 157:4 today's 19:4 165:1 together 22:3 35:16 36:22 46:8 137:22 154:12 token 5:13 told 54:19 Tom 22:16 35:6 66:5 128:1 154:13 top 90:18 142:1 topic 35:10 46:19 topics 10:13 22:3 total 90:21 91:18 totality 119:9,9 totally 32:4 117:25 136:15 touched 163:2 towards 36:23 43:1 62:1 Tower 164:1 track 102:14 trading 137:3 training 15:10 16:24 17:4,7 78:16 126:9 128:23 trait 36:18 108:5 traits 27:14 33:16 67:11 transcended 113:11 transcendent 77:1 109:19 112:9 115:19 116:1 transcribe 4:24 transcribed 5:16 171:9 transcript 171:10 transitional 169:9 trap 142:21 143:13 trapping 143:3 treatment 112:19 tree 67:1,16 138:21 139:21 140:21 145:7,11 trees 137:16 tried 64:8 132:15	166:10 tries 13:7 158:23,25 Troy 171:18 true 11:17 34:8 42:10,17 46:20 54:20 59:10 78:17 79:1 84:3 91:8 104:24 110:8 119:25 120:9 121:23 126:14 129:8 133:6,22 135:24 155:3,8 157:2 159:14 165:21 167:15 171:9 trust 162:25 truth 4:6 90:21,25 91:18 171:7 try 4:20 5:4,6 7:14 10:23 12:19 19:18 36:24 64:9,18 119:18 130:13,15 145:17 159:2 trying 5:14 8:7 9:5 14:9 16:18 21:12 24:15 26:8 28:6,7 29:24 31:16 37:15 42:7 43:2 52:17 53:21 54:11 56:6 56:20 57:18 59:23 63:18 71:5 75:18 76:5 80:11 82:10 88:14 95:7,13 99:20 101:13 103:22,25 119:22 121:4 122:12 127:10 130:8 142:16,17 147:10 147:19 157:20 158:3,19 159:3,16 160:4,25 161:3 167:13 Tuesday 1:19 4:2 turn 36:18 103:11 106:13 122:8 142:5 turned 135:21 143:12 turns 84:2 106:12 106:16 twelve 66:6 twenty 66:6 two 6:19 10:12,14 10:21 15:24 16:11 22:3 40:19 41:10 41:12,17,18 61:24	77:17 78:21 92:5 92:7 99:13 102:22 104:11 109:1 111:17 126:4 128:19 152:22 type 33:3 86:19 166:12,13 typically 73:1 75:6 138:9,11 139:1,14 139:19 145:18 149:11 150:24  U U 170:3 ultimate 151:1 152:25,25 153:12 153:12 ultimately 35:20 umbrella 140:6,7 un-hom 73:12 125:21 unanswered 48:23 unarticulated 13:9 13:19,19 unaware 110:20 unclear 59:10 111:6 114:8 uncomfortable 6:7 under 9:8,20 10:1,5 47:4,19 48:12 49:1 51:23 68:6 81:11 97:23 109:6 117:11 118:10 121:12 127:2 140:6,7 146:5 147:16 undergraduate 15:11,12 16:13,15 16:16,20 underlying 13:8 undermine 160:19 undermining 162:2 underneath 142:2 understand 5:14 8:2 8:12 12:19 13:17 13:23 15:8 16:18 17:23 18:11 21:9 22:10,12 28:6 33:23 37:15 39:5 47:5 49:23 50:2,3 51:25 52:13,24 53:7 54:11,14,22 55:3 56:6,20 57:18 58:13,16,25 59:12,15,22 60:7 61:3 63:1,18,20
--	---	---	---	--



ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

24

64:12 69:19 70:15 70:16 71:5 72:24 74:15 76:5 79:17 80:7,20 82:7,10 86:5 88:15,19 89:11 96:2 97:7 102:5 103:22 106:24 107:15 109:14,23 112:17 113:24 114:18 115:25 116:22 118:25 119:20 123:5 124:18,22 128:13,14 131:16 132:14 143:1 153:25 157:20 158:2,14 161:2,9 165:10 166:6 169:10 understandable 80:19 83:11 understanding 8:3 8:22 13:8 14:13 31:21 34:23 44:6 47:9 50:6 62:16 63:3 65:18 66:3 66:22 84:7 85:14 85:24 86:18 91:24 95:2 96:25 98:8 110:11 123:7 124:10 133:21 134:15 139:10 145:13 148:20 156:17 158:15 understands 123:10 161:1 understood 14:10 14:10,16 52:6 54:2,3 57:1 68:5 68:12 96:22 97:10 137:21 undirected 151:13 151:17 152:13,21 unequivocal 154:25 unification 135:15 135:22 unifies 134:22 135:16,24 uniform 120:17 uniformitarian 120:9,10 uniformitarianism 120:19 unifying 135:8 United 1:1 43:8 University 6:17	16:2 40:16 unknown 32:8 unless 106:12 132:10 144:23 unlikely 6:6 unpackaging 13:19 unpacking 14:7,14 unreasonable 161:21 162:1,7,8 162:10,12,19 unscientific 60:14 105:3 109:16 124:1 unspecified 74:8 unsure 114:14 until 5:17 32:8 160:8 unusual 4:21,22 upshot 113:1 117:7 upside 142:5 usable 83:22 use 10:12 13:1 14:3 33:19 60:1,19 66:15,17,19 68:1 68:11 73:15 76:10 77:25 78:5 80:20 85:4 86:6 87:11 92:21 98:16,17,20 99:2,3,7 100:4 128:15 141:14,20 141:24 142:10 143:9 145:12,18 145:21,25 147:11 147:18 155:20 used 13:6,11,20 14:4,7,8 45:9,11 45:13,18,19,22 49:13 60:11 61:10 65:3 67:20,21 69:8 76:13 77:17 77:22 78:9 80:12 81:23 86:12 98:21 99:16 102:16 103:25 112:24 142:21 144:13,19 148:12 151:15 useful 143:2 151:21 uses 28:3 86:25 87:17 99:20 100:3 using 12:14 14:17 18:13 22:21 70:25 73:15 77:21 78:2 80:3 86:23 99:19 101:3 117:10 118:17,20 125:6 139:25 141:9,15	usually 142:1 UT 16:5 utterances 63:2 utterly 22:22  V vague 5:10 validating 92:17 variability 146:1 variable 45:4 102:12,24,24 103:5 variables 101:18 102:11 103:24 variation 23:21 35:3 36:21 variations 72:15 151:19,20,22 152:11,15 variety 45:8 47:21 48:8 69:21 71:3 various 22:11 27:24 69:8 140:22 141:5 142:14 vary 24:13,17 102:23 venture 119:15,24 121:16 vera 157:1 verbal 5:1,5 version 123:22 versus 131:5 147:7 very 19:14,21 23:25 31:9 65:14 80:18 86:19 87:13,15 89:22 94:17 95:25 99:6,18 104:2 113:10 115:22 129:6 140:6 145:3 151:2,7 156:25 159:1 167:21 viability 32:23 view 8:19 9:16 11:21 34:4 46:22 46:23 48:11 50:4 52:10 55:10 56:6 56:20 61:22 65:1 69:16 75:9,21 81:5 84:7 87:24 89:5,6 90:25 91:3 91:5,18 98:14 105:23 108:12 114:15 115:13 117:9 134:5,25 136:5,12,14 142:17 152:8,8,10	153:21 158:19 159:5 160:15 162:10,11,18,19 viewing 92:9 views 46:19 47:3,16 48:4,7,12 68:20 69:20 74:9,17,19 74:20 75:13 85:21 120:20 virtual 24:19,21 virtue 7:25 9:6 101:1 102:25 135:22 165:20 vis-a-vis 30:15 vs 1:10  W wait 5:17,22 59:20 110:18 want 6:1,25 11:7 18:16 20:15,16 25:11 29:16 35:5 35:11 36:23 39:4 41:15 44:10 46:2 47:5 49:9 55:1 60:7 66:5 73:17 77:17 82:14 87:10 98:8 100:9 103:13 110:14 116:10,18 126:7,10 129:1 138:18 140:13 142:21 148:4 154:11,18 164:17 165:2 wanted 22:11 148:6 wanting 166:7 wants 24:14 26:17 138:15 wasn't 53:13 56:19 60:23 62:5 79:23 80:6 136:17 138:3 157:22,24 159:18 159:25 169:1,10 watch 33:5,6 34:7 way 6:5 9:7,19 11:3 12:11 13:12 14:3 14:21 15:7 21:8,8 21:12 22:3 26:2 28:5,13 29:16,21 31:2,3,4,15 34:1,8 35:21 37:16 38:4 38:6,8 45:25 47:2 48:1 50:6,18 51:1 52:6,8,9,20,24 53:17 55:3,20 56:2 57:1 58:6,14	59:6,16,23 60:11 61:3,8 62:25 64:8 64:9 67:19 68:8 69:24 70:12,16,16 71:4 72:5,8,12 73:1 78:22 79:17 79:21 80:11,25 82:20 83:12 84:11 85:5 86:5 87:18 88:6 91:12 92:9 92:21 95:24 98:11 99:15 102:8 104:7 104:25 105:13,22 106:19,21 108:21 110:14,14 111:15 111:16 112:9 115:23,24 117:9 118:15,18,19,19 118:20 120:17 121:7 123:15 124:4 125:5,10 127:18 129:4 130:8,9 133:14 134:2 135:10 138:12 140:1,8,14 141:8 143:8,20 145:24 147:10,14 147:22 151:22 153:8,19 155:7,9 158:24 159:2 160:5 161:5,9 162:7,7,8 163:20 163:21,23,24 164:6 167:7,19 168:25 Wayne 171:25 ways 4:22 25:22 27:10 32:3,6 37:19 48:15 60:14 60:18 61:11 69:2 69:8,21 70:6 71:3 72:20 76:14 98:22 117:10 130:8 141:5,21 160:14 weaker 102:10 web 39:20 weeks 6:20 16:11 well 8:20 9:13 12:1 17:15 21:7 26:5 27:12 28:6,13 32:7 34:1,20 36:4 42:6 44:4 46:15 48:20 49:23 52:24 58:20 63:19 67:7 69:9,24 72:8 73:20 78:13,21
---	--	--	---	---



ROBERT T. PENNOCK, Ph.D., JUNE 14, 2005

25

80:25 103:22	78:13 80:1,6	23:20 44:15,15	136:19	3
105:15 106:17	84:13 92:1 93:22	84:13 126:14		3 44:8 46:1
107:10 108:10	100:12 104:19	160:3	Y	36th 1:21
109:8 111:15	106:17,18 114:25	works 23:24 24:2	yeah 11:24 32:13	4
115:17 118:19,25	115:9 117:12	32:16 35:21 42:3	40:24 41:12 50:13	41:10 3:7 49:3
119:20 121:4,24	118:19 126:15	85:25 86:6 146:21	53:4 88:4 89:13	53:17 57:19 70:8
123:1 126:20	131:11 137:4	146:22 147:16	103:22 113:24	4,3 60:13,20,25
129:8,9,13 130:5	138:19 140:10	149:9	119:19 126:2	97:23
131:10,10,23	141:10 146:8	workshop 42:1	128:9 130:11,18	44 3:16
133:8,9,13,23,25	154:8 163:14,16	world 11:17 27:3,15	132:7 136:23	48105 2:13
134:6 139:3	163:17,22	52:7,11 77:23,23	143:6 147:24	48823 6:15
141:11 143:23	whereof 171:18	79:6,24,25 82:3,3	148:25 154:17	
145:20,20,23	while 19:15 135:20	82:8,9 83:2,2,4	163:2 164:14	5
146:8,13,17,23	whole 74:23,24 75:4	84:1 92:9,19,21	year 16:3 43:14	5 69:9,14 71:8 73:9
147:10 148:19	84:19 92:22 94:3	93:9 95:2 100:18	years 16:3 18:21,23	73:10 87:9
150:10,15,23	95:5 97:2 98:23	100:19 101:6,7	39:13 44:15,22	5:36 169:17
151:2 155:6 156:3	99:12 115:12	106:25 107:1,23	67:25 75:10,12	6
156:5,6,7 157:15	118:24 132:16,19	112:4 113:13	132:8 158:8	6 80:18
157:17 160:21	135:3,14 158:8	116:4 133:19	yep 125:21	609 6:15
163:5,10 164:8,12	159:14 160:19	135:3 149:14	young 75:8	
164:18	wide 46:12 48:12	150:6 158:11,19	younger 142:1	7
well-tested 134:21	William 12:8	163:15,18 165:22		7 116:12
135:7	willing 107:10	165:23 167:25	0	717 2:7
went 130:1 158:7	willingness 107:4,16	worlds 85:17	04-2688 1:10	734 2:14
were 9:12 38:14	wind 36:12 38:19	worried 159:11	1	8
40:16,19 41:17,19	160:8 162:4	worries 159:7	1 3:15 44:1,2 70:8	8 41:11,12 85:6,9,9
54:21 55:8,9	window 160:21	worry 159:11	1st 6:24	827-2001 2:14
57:19 59:17 60:20	winds 162:6	wouldn't 18:16 48:9	1:16 66:10	9
60:22 63:24 78:24	wish 25:13 29:15	56:23 96:14 127:5	10 96:16	9 31 1:20 4:3
79:15,16 84:21	45:23	127:9 149:22	10,000 75:10	
86:18,23 101:4	witness 3:3 30:17	153:19 156:16	100 1:21	
107:19,23 118:13	66:7 171:5,8,11	wrap 31:20	12:18 66:8	
118:15 120:24	171:18	Wright 2:12	125 3:17	
122:16 124:4,11	witnesses 19:5	write 38:5 47:2	141:19 4:2 60:16	
124:21 129:23	40:23,23,24	writing 18:21 22:13	80:12 87:9 88:13	
133:24 135:11	wondering 9:7	68:19 90:18 93:6	97:23 98:2,4	
137:14,14 141:5	word 37:24 67:7	99:14 161:14	15 18:23 67:25	
141:19 142:20	73:23	171:8	150 132:8	
143:2,12 146:18	wording 87:16 91:2	writings 45:3 56:3	17101 2:6	
147:22 151:19,22	129:4	65:22 69:3 70:24	18 85:6,8,9	
151:24 161:7	words 60:12 70:25	96:7 98:13,22	19 171:20	
164:17 166:9	71:4 77:17 91:17	99:25 108:11		
were'n't 156:18	113:24 124:11,14	110:7	2	
161:8	work 7:1,5,5 15:7	written 4:25 47:11	2 3:17 73:9,10	
Wesley 7:11	15:13,21 17:1,13	55:22 56:2 63:5	125:16,17 128:20	
we'll 6:2 121:24	21:10 22:13 23:6	65:20 87:7 89:8	20 18:21 100:6	
124:10 126:7	32:21 36:22 39:1	98:20	200 2:5	
we're 9:20 29:23	39:21,21 40:1	wrong 34:20 53:17	2000 16:4	
30:11 31:16 42:15	49:25 75:16 92:11	135:21 143:15	2005 1:19 4:2	
81:18 107:2 115:8	110:11 111:16,17	152:10 158:24	170:19 171:20	
118:3,22 122:1,21	114:21 135:10	161:2	21 101:10 103:23	
124:6 127:7,10	155:23,24 156:20	wrote 35:19 117:21	23 161:9,16	
130:7,13,14 157:1	158:16 161:3	148:9	242:12	
157:1 163:21	166:20,22	X	255-1155 2:7	
166:12 168:17	worked 100:24	X 3:1,11 4:8 126:25		
we've 42:24 60:16	working 22:19			